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THE FESTIVUS

A publication of the San Diego Shell Club

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MEMBERSHIP AND SUBSCRIPTION

Annual dues are payable to San Diego Shell Club. Single member: $7.00; Family membership: $8.00; Overseas (surface mail): $10.00
Address all correspondence to the San Diego Shell Club, Inc., c/o 3883 Mt. Blackburn Ave., San Diego, CA 92111
Single copies of this issue: $5.00. Postage is additional.
Meeting date: third Thursday, 7:30 P.M. Room 104, Casa Del Prado, Balboa Park

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PROGRAM

Dr. Hans Bertsch will give an illustrated talk entitled "Opisthobranch Zoogeography and Evolutionary Ecology Along the Baja California Coastlines."

Meeting date: 17 January 1985

CONTENTS

Publication date: The publication date of The Festivus appears on the masthead above. The Festivus is published monthly except December.

A NOTE FROM THE EDITOR

With this issue, The Festivus embarks on its sixteenth year of continuous publication. It is appropriate at this time to recognize several people who deserve our special appreciation for their longstanding contributions to our publication. Among these is David K. Mulliner who has served as staff photographer since the first photograph appeared in The Festivus in 1972. Without his technical expertise and his unwavering willingness to help, The Festivus would be of far less worth. For over seven years now, Barbara Myers has quietly helped each month with the collating, addressing, and mailing of The Festivus, a time consuming job which receives little or no public attention. And lastly, thanks to Jules Hertz The Festivus has a minimum of typographical errors. Jules has been proofreader and a silent reviewer since 1976 when this current editor took over from Blanche Brewer who wished to retire. To these individuals a long overdue public thank you.

The San Diego Shell Club executive board has approved the establishment of a scientific review board for The Festivus, effective with this issue. You may already have noticed the new entry on our cover page. Our appreciation goes to the committee of nine distinguished scientists who have graciously consented to review the more technical papers submitted. The Festivus welcomes all contributions which further the understanding of mollusks. Both popular and scientific articles are actively solicited. At this time The Festivus does not publish descriptions of new taxa.

PUBLICATIONS RECEIVED FOR THE CLUB LIBRARY

McLEAN, JAMES H.
Systematics of *Fissurella* in the Peruvian and Magellanic Faunal Provinces (Gastropoda: Prosobranchia). 1984. LACM Contrib. in Sci 354. (See review in this issue).

ROTH, ALEX
Molluscan Melange. Received December 1984. Aljemasu Enterprises, 184+pp.

GOSLINER, TERRENCE M.
A Review of the Systematics of *Cylichnella* Gabb (Opisthobranchia: Scaphandridae) 1979. Nautilus 93(2-3):85-92.

The Systematics of the Aeolidacea (Nudibranchia: Mollusca) of the Hawaiian Islands, with Descriptions of Two New Species. 1979. Pac. Sci. 33(1):37-77.

A New Species of Tergipedid Nudibranch from the Coast of California. 1981. J. Moll. Stud. 47:200-205.

A New Record of the Nudibranch Gastropod *Polycera hedgpethi* Marcus, from the Indian Ocean of South Africa. 1982. J. Moll. Stud. 48:30-35.

The South African Janolidae (Mollusca, Nudibranchia) with the Description of a New Genus and Two New Species. 1981. Ann. S. African Mus. 86(1):1-42.

____________ & R.J. GRIFFITHS
Description and Revision of Some South African Aeolidacean Nudibranchia (Mollusca, Gastropoda). 1981. Ann. S. African Mus. 84(2):105-150.

____________ & W.R. LILTVED
Comparative Morphology of Three South African Triviidae (Gastropoda: Prosobranchia) with the Description of a New Species. 1982. Zoo. J. Linn. Soc. 74(2):111-132.

GILES, ELIZABETH & TERRENCE GOSLINER
Primary Type Specimens of Marine Mollusca (excluding Cephalopoda) in the South African Museum. 1983. Ann. S. African Mus. 92(1):1-52.

Also received:
Encontro Brasileiro de Malacologia. Soc. Brasileira de Malac. Sept. & Oct. 1984 (nos. 37, 38).
The Connoisseur of Seashells. Gemme del Mare. Jan. 1985. (illus. catalogue).24 pp.

MOLLUSKS WHICH TRUNCATE THEIR SHELLS AND HOW THEY PLUG THE OPENINGS

BY

BERTRAM C. DRAPER

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At least three molluscan families include genera whose species intentionally truncate the earlier sections of their shells. In each case the unwanted section of the shell is either weakened so that it will later break off or it is completely cut off by action of the mollusk's mantle. Depending on the habitat of the mollusks involved, it is probable that the reasons for this action are either to lighten the amount of shell being carried around or to lessen the amount of wave battering it will receive.

I first became aware of the truncation process in 1962 when I was preparing to photograph a *Caecum* shell that appeared to be the species Bartsch (1920) described as *Micranellum rosanum* and Stearns (1886) had previously described as *Caecum magnum*. [Abbott (1954:148 and 1974:91) synonymized *Micranellum rosanum* with *Caecum crebricinctum* Carpenter, 1864]. As I posed the shell shown in Figure 1, it broke and exposed a second plug or septum. This aroused my interest in the caecids and their unusual habit of getting rid of the apical or early sections of their shells. Figure 2 shows a *Caecum californicum* Dall, 1885 which seemed to have a second plug. I intentionally broke the early part of the shell and exposed the suspected plug. It appears that these caecids are not always

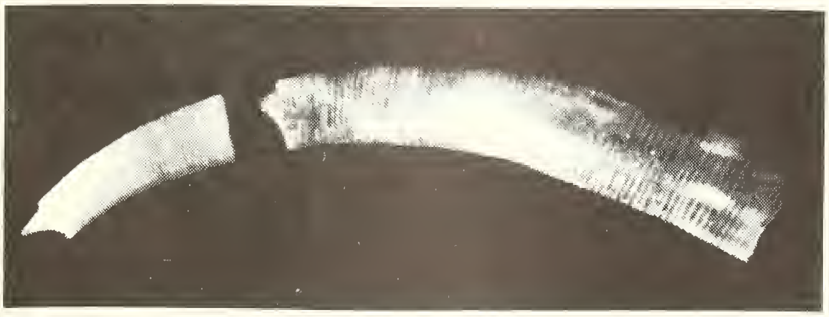

Fig. 1. *C. crebricinctum*, a specimen which broke while being posed, revealing a second plug already in position. Photo taken in 1962.

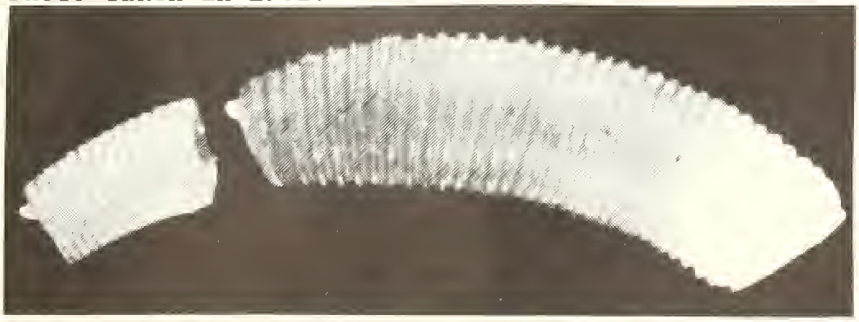

Fig. 2. *C. californicum*, specimen intentionally broken to reveal a second plug thought to be there.

successful in breaking off the early sections of shell, but it is rare to find a fully mature shell which has not completed truncation. Five specimens of Caecidae are shown in Figure 3. Each is a representative of one of the five genera or subgenera of caecids in the Eastern Pacific which truncates its shell.

There is at least one genus of the family Caecidae that does not truncate its early growth stages. This is *Strebloceras* Carpenter, 1858, described from a fossil species, but also found living in Hawaiian waters. Figure 4 shows five specimens of *Strebloceras subannulatum* de Folin, 1879 collected by the author at Kawaihae, Hawaii in 1981. It would appear that this genus might represent the early primitive form of the Caecidae before it evolved the process of truncating sections of early shell growth. Another genus of the Caecidae which resembles the *Strebloceras* in its partially twisted shape, but which truncates the earlier shell sections is *Meioceras* Carpenter, 1858, shown by a growth series of *M. nitidum* (Stimpson, 1851) in Figure 5.

Fig. 3. Mature shells of five genera or subgenera of Eastern Pacific Caecidae. l. to r.: *C. clathratum*; *C. (Micranellum) crebricinctum*; *C. (Elephantanellum) laqueatum* C.B. Adams, 1852; *Fartulum occidentale* Bartsch, 1920; *Fartulum (Elephantulum) insculptum* (Carpenter, 1857)

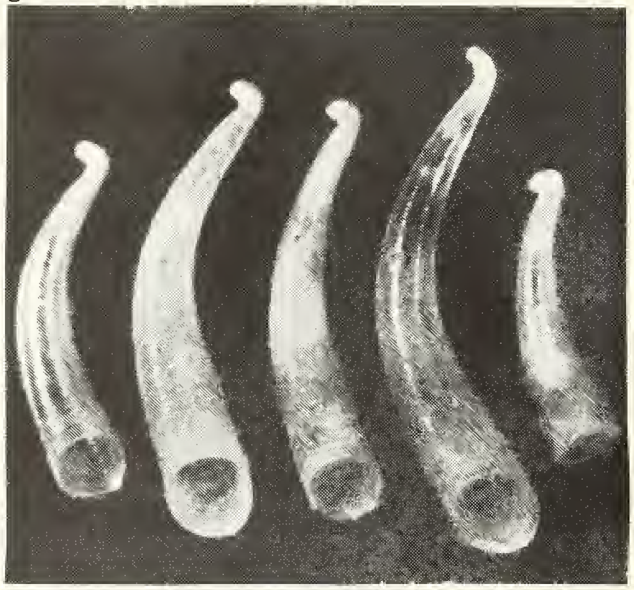

Fig. 4. Five specimens of *Strebloceras subannulatum* from U.S. government dredged material collected by the author in 1981 at Kawaihae, Hawaii, H.I.

Fig. 5. A growth series of *Meioceras nitidum* collected off Key West, Florida by Capt. Riley Black.

In Figure 6, I have assembled a growth series of *Caecum chilense* Stuardo, 1962 to show what a complete *Caecum* shell might look like if truncation was not practiced. It is easy to see what a burden this complete shell would be to its tiny occupant.

To further study the caecid process of truncation and plug building, I selected a specimen of *Caecum crebricinctum* which appeared to have a second plug inside and sectioned it horizontally by grinding the shell down with fine emery paper. The result is shown in Figure 7. Figure 8 shows an enlargement of the upper portion of the specimen shown in Figure 7. It appears that the animal first weakened a very narrow groove around the shell, possibly from the outside. Then it constructed the new plug from the inside, extending it well

Fig. 6. Growth series of *C. chilense* arranged to show how it might have appeared had it not performed truncation. From shells collected by J.H. McLean off San Lorenzo Is., Peru in 1974.

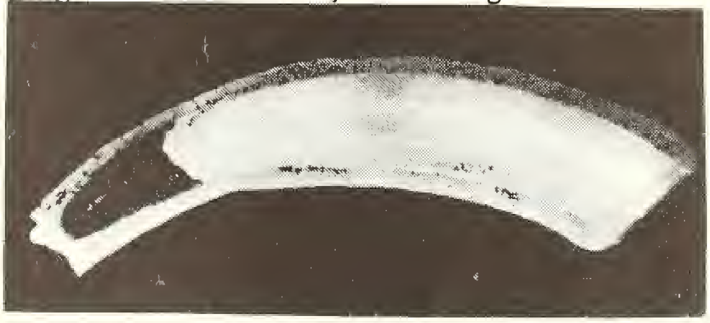

Fig. 7. Sectioned shell of *C. crebricinctum* showing second plug in place before earlier section had broken off.

Fig. 8. Enlarged view of same sectioned shell shown in Figure 7.

below the "weakening groove" and cementing it to the inside wall of the shell. It then added a layer of porcelain-like lining, the same as in the rest of the shell. In my study of the living Caecidae (Festivus 1982(3):29-32), I observed that these animals have a way of jerking their shell forward by pushing out their operculum and snapping it back in when the animal becomes impeded while moving through sand or debris on the rock. It is my guess that this is the method they use to break off the early shell sections.

The genus *Truncatella* was named for its habit of truncating its shells. Figure 9 shows a growth series of *Truncatella californica* Pfeiffer, 1857, with only the shell at the left having been truncated. These mollusks seem to completely cut off their unwanted whorls when they reach about their eighth whorl of growth. In Figure 10, three specimens (from a lot collected in Newport Bay by Emery Chace in 1916) show the approximate period of their growth when

they performed truncation. The shell at the right has probably just completed the process. Mature shells, as shown in Figure 11 have about $4\frac{1}{4}$ whorls and are always truncated with a plug capping the opening at the place of truncation. A closer view of two sectioned shells (Figure 12) shows that the cap or plug is in three layers just as in the Caecidae, but it was constructed from the outside by the mantle just after the early whorls had been cut off. It probably dissolved the old shell material and used this dissolved material to help build the cap. However, the inner porcelain-like layer was most likely laid by the mantle from the inside.

Fig. 9. Growth series of *Truncatella californica* taken live in 1916 from Newport Bay. Largest shell is about 5.5 mm in height.

Fig. 10. Three *T. californica* which had just completed truncation. They would have added about two more whorls before maturity had they survived.

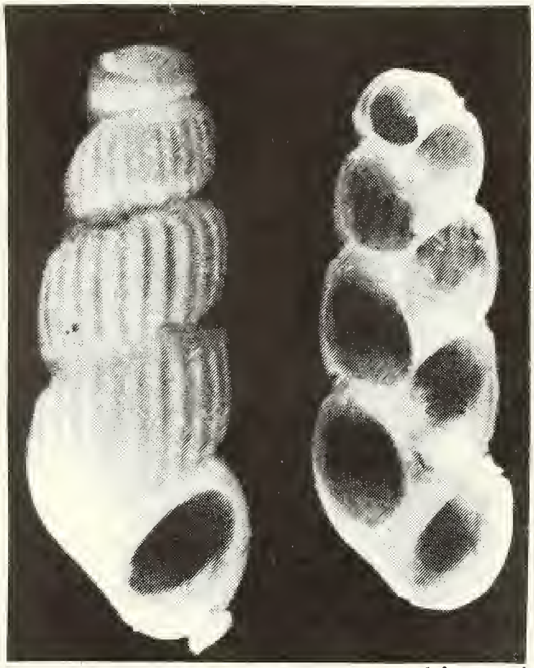

Fig. 11. Two mature *T. californica* shells, the one at the right having been sectioned. They were collected by the author at White's Point, San Pedro, California about 25 years ago.

Fig. 12. Close-up of the posterior of two sectioned *T. californica* which truncated and built plugs.

That the cap was first built from the outside is indicated in Figure 13 which shows that the cap extends over and into the ribs and interspaces. The genus *Truncatella* is represented by several species in the Californian and Panamic provinces as well as in the Atlantic and Caribbean waters.

The third family which includes species that truncate their shells is the Buccinidae. In the genus *Caducifer*, several species truncate their apical or early whorls. These species have been placed in *Caducifer* s.s. and are somewhat larger than the groups previously discussed, reaching at least 14 mm in length. *Caducifer decapitata* (Reeve, 1844) and *C. truncata* (Hinds, 1844) are found in various places in Indo-Pacific waters, but have not been reported from the Eastern Pacific. All specimens in my photographs were collected by Mert Goldsmith along the shores near Hilo, Hawaii, where he now lives. They are *Caducifer decapitata*. Figure 14 shows two mature shells of just over three whorls. They probably had added about two whorls after truncation. Their colors are deep reddish-brown and white. A growth series of three immature shells is shown in Figure 15. with the shell at the right nearly ready to truncate just above the final whorl.

In Figure 16, the shell at the right has been sectioned and shows that the plug or cap covers the entire opening left by truncation. The apical, or early, portion of the shell is either weakened to be broken off by wave action, or is completely severed by dissolving of the shell material. The break is very jagged. Figure 17 shows a close-up of the plugged end and indicates that the plug was probably constructed from the inside. It possibly used the shell material

Fig. 13. Close-up of the outside of the posterior of two truncated shell of *T. californica* showing how the plug overlaps the external sculpture.

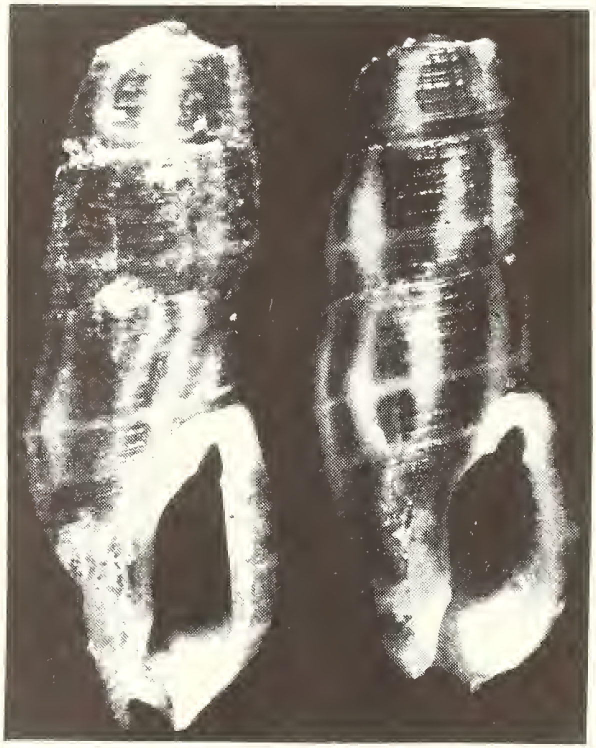

Fig. 14. Two mature specimens of *C. decapitata* from the collection of Mert Goldsmith. Largest shell is about 13 mm in height.

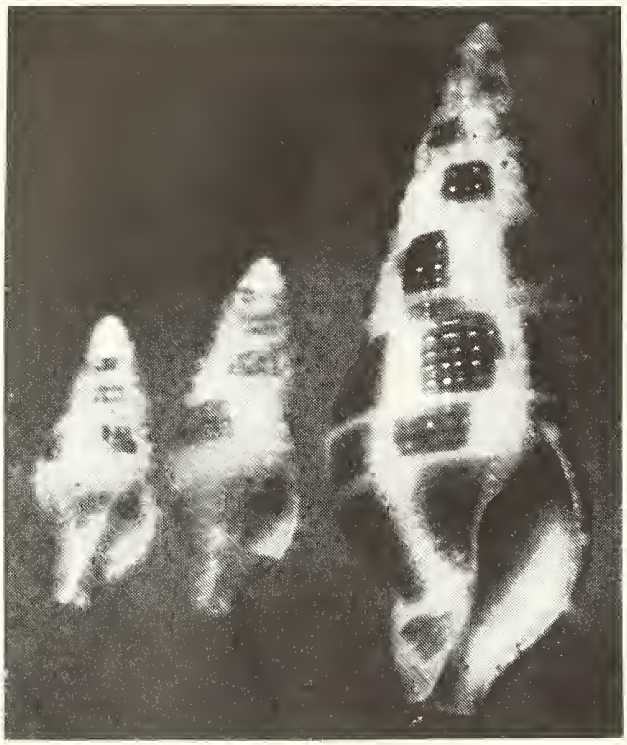

Fig. 15. Growth series of three immature *C. decapitata*. The shell at the right was ready to truncate, probably between the two lower spiral white lines. Largest about 12 mm.

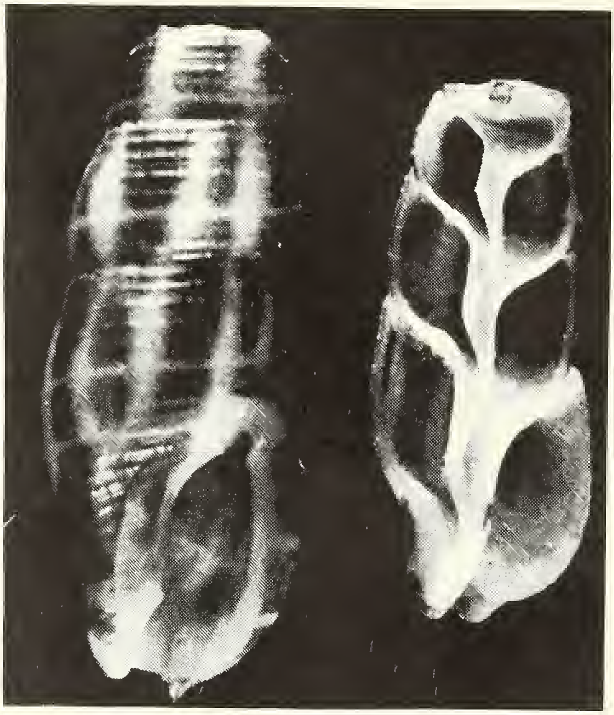

Fig. 16. Mature *C. decapitata* at left and nearly mature sectioned shell of same species at right showing shell structure and capping plug.

Fig. 17. Interior close-up of plug capping the shell shown at right in Figure 16. Note colored outer coating of the plug.

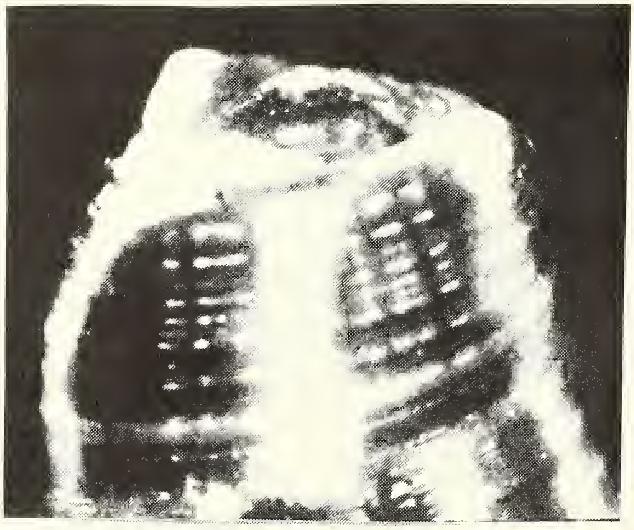

Fig. 18. Close-up of the sectioned shell shown at the left in Figure 16. Note the spur of the columella on which the plug was built. Its extension downward was severed by the sectioning.

dissolved from the inner perimeter of the shell when it was weakened for truncation. The plug was built in three layers; a strong center layer cemented to the inner wall, a thinner layer of porcelain-like material similar to that which covers the entire inside of the shell, and an outer layer that matches the brown and white outer sculpture of the shell. Figure 18 shows this outer coating as well as the jagged edges where the earlier whorls broke off. It is quite likely that this colored outer coating was constructed from the outside after the early whorls had broken off. Two discarded sections of these earlier whorls are shown in Figure 19.

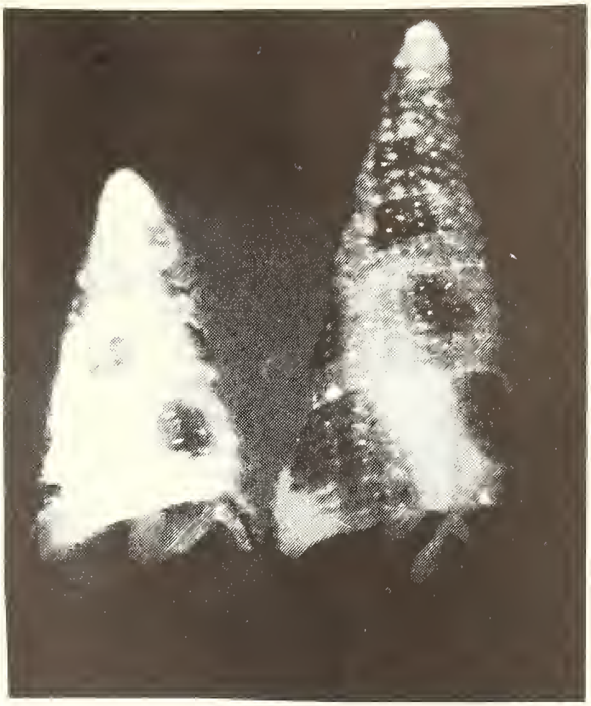

Fig. 19. Two discarded shell sections of *Caducifer decapitata*. Note the ragged edges at the truncation perimeters.

My sincere thanks go to Mert Goldsmith for providing the *Caducifer* specimens for my photographs and to James H. McLean for the loan of the *Caecum chilense* shells form the Los Angeles County Museum (NH) collection. And of course belated thanks go to the late Emery Chace for the many specimens he gave me, including the specimens of *Truncatella* used in this paper.

LITERATURE CONSULTED

ABBOTT, R. TUCKER
1974. AMERICAN SEASHELLS Second Ed. Van Nostrand Reinhold, N.Y., 663 pp., illus.
BARTSCH, PAUL
1920. Northwest coast mollusks. Jour. Wash. Acad. Sci., pp. 565-572.
DRAPER, BERTRAM C.
1982. Observations of living *Caecum crebricinctum*. The Festivus 14(3): 29-31.
FOLIN, L. de
1875. Monographie de la famille des Caecidae. Imprimerie A. Lamaignere, Bayonne. pp. 1-31, pl. 1.
KAY, E. ALISON
1979. HAWAIIAN MARINE SHELLS. Bishop Mus. Press, Honolulu, 653 pp., illus.
KEEN, A. MYRA
1971. SEA SHELLS OF TROPICAL WEST AMERICA, 2nd Ed. Stanford Univ. Press, 1064 + pp. , illus.
McLEAN, JAMES H.
1978. MARINE SHELLS OF SOUTHERN CALIFORNIA. L.A. County Nat. Hist. Mus., Sci. ser. 24, Revised ed., 104 pp., 54 pls.
STEARNS, R.E.C.
1886. Manual of Conchology, Phila., Vol. 8:218, pl. 67, fig. 83.

NEW PUBLICATION

SYSTEMATICS OF FISSURELLA IN THE PERUVIAN AND MAGELLANIC FAUNAL PROVINCES (GASTROPODA: PROSOBRANCHIA)
By James H. McLean. 29 October 1984.
Contributions in Science, Number 354, Natural History Museum of Los Angeles County. 70 pages, 267 figures.
No price given. Sold through Museum bookstore.

This recent monograph is outstanding in its thoroughness and will serve many as an example of how to systematically and logically present a subject. It covers the *Fissurella* species of the cool waters of Peru, Chile, and southern Argentina. Some 58 names for Recent species had previously been introduced in the literature for the large number of highly variable, sympatric species that occur in the Peruvian and Magellanic faunal provinces. The author reduces the number of species to 13, three of which have geographic subspecies.

McLean recognizes two subgenera of *Fissurella* Bruguière, 1789: *Fissurella sensu stricto* and *Cremides* H. and A. Adams, 1854. He defines *Fissurella sensu stricto* as having a two-layered shell, the outer layer composed of calcite and the inner layer of aragonite and distinguishes it from *Cremides* in which the shell is composed entirely of aragonite. This is the first time that the subgenera have been so defined. The colored shell margin is indicative of a two-layered shell rather than merely a color difference. *Balboaina* Perez-Farfante, 1943, previously used for South American species having the shell margin is synonymized with *Fissurella, sensu stricto*. Most tropical species of *Fissurella* are in the subgenus *Cremides* and are not treated in this work.

The species of *Fissurella, sensu stricto,* total 15: the 13 species of Peru and Chile treated in detail, plus the Caribbean type species *F. nimbosa* Linnaeus, 1758 and the Californian *F. volcano* Reeve, 1849. The species recognized by McLean are *F. peruviana* Lamarck, 1822; *F. maxima* Sowerby, 1835; *F. latimarginata* Sowerby, 1835; *F. cumingi* Reeve, 1849; *F. costata* Lesson, 1831; *F. picta picta* Gmelin, 1791; *F. picta lata* Sowerby, 1835; *F. radiosa radiosa* Lesson, 1831; *F. radiosa tixierae* Métivier, 1969; *F. oriens oriens* Sowerby, 1835; *F. oriens fulvescens* Sowerby, 1835; *F. nigra* Lesson, 1831; *F. limbata* Sowerby, 1835; *F. crassa* Lamarck, 1822, *F. bridgesii* Reeve, 1849; and *F. pulchra* Sowerby, 1835. Key characters (size, height, mature sculpture, outline of base, shell color, shell margin, mature foramen, foot side color) are charted for each of these and a distributional plot is also given. McLean recognizes three groups within the subgenus *Fissurella, sensu stricto,* based on the presence or absence of complex radial sculpture and the relative thickness of the calcitic and aragonitic shell layers.

This monograph contains a very thorough historical review. It also has a large section on Structure covering internal anatomy, external anatomy, radula, shell morphology, and shell structure. The Biology and Ecology section covers habitat, feeding, reproduction and growth, epibiotic associations, shell borers, parasites, seastar predators, vertebrate predators, and human predation. Large sections are also devoted to systematic characters, distribution and zoogeography, and the fossil record. Each of the species recognized is thoroughly documented with complete synonymy, shell description, discussion of the juvenile shell, discussion of the mantle and foot, habitat, distribution, number of lots examined, taxonomic history, etc.

The monograph is based chiefly on the collection now in the Los Angeles County Museum of Natural History with studies of additional material from a number of U.S., European, South American, and New Zealand museums. The bulk of the material resulted from nine major expeditions with McLean participating personally in four of them. The text is accompanied by excellent photographs of shells and animals and a number of scanning electron micrographs of shell structure and radulae.

Jules Hertz

CYCLOTHYCA CORRUGATA STEARNS, 1890

BY

HELEN DUSHANE

15012 El Soneto, Whittier, California 90605

In 1890 Stearns described a mollusk new to science. Because he believed it did not fit into the genus *Thyca* H. & A. Adams, 1854, he created a new subgenus, *Cyclothyca* Stearns, 1890, type species *C. corrugata*. See Figure 1. The two specimens from off the west coast of Nicaragua are at the National Museum of Natural History, Smithsonian Institution (USNM No. 101944). Like *Thyca,* Stearns suggested that the species might be parasitic on some form of sea life. Keen (1971:467) thought that perhaps the species "could have been incorrectly labeled with respect to locality," since she had not found any further reports of the species being collected.

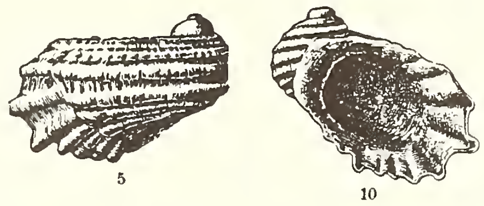

Fig. 1. *Cyclothyca corrugata* reproduced from Stearns (1890, figures 5 and 10)

From a pint of grunge taken from Panama Bay in 1981, I extracted two specimens of *Cyclothyca corrugata*. One specimen is 10 mm in length, 5 mm in width; the second is 5.5 mm in length and 4 mm in width. Thus, the species is established as Panamic, with a large range extension south from Nicaragua.

Literature Cited

STEARNS, ROBERT E.C.
1890. Descriptions of new West American land, fresh-water, and marine shells, with notes and comments. Scientific results of explorations by the U.S. Fish Commission steamer "Albatross." PUSNM 13:212, pl. 15, figs. 5, 10.

KEEN, A. MYRA
1971. Sea shells of Tropical West America, p. 467, figs. 834.

CLUB NEWS

FROM THE MINUTES - SAN DIEGO SHELL CLUB MEETING - 15 NOVEMBER 1984

Our lecturer for the evening was member Anthony D'Attilio, acting curator of Malacology at the San Diego Natural History Museum, whose intriguing topic was "Periostracum of Mollusks."

The periostracum is a covering on the exterior of many shells. It can vary from a thin varnish-like coating to a thick and hairy one. For many of us, it is something to remove to reveal the beauty of the shell underneath or to preserve in order to show the mollusk as it lives in nature.

First, to demonstrate how thin and shining a periostracum can be, Tony chose *Papuina pulcherrima* (Rensch), the strikingly colored bright green tree snail from Manus Island. A weak solution of bleach will dissolve this periostracum and the result will be a dull white shell. The same is true for several species of mytilids that also have a shiny green periostracum. Preserving the periostracum often enhances the collector's specimens, and it is wise to proceed cautiously.

Methods of preserving the periostracum, as well as removing it, were discussed.

The periostracum in fresh water mollusks acts as a protection against the minerals in the water. Should sections of the periostracum become eroded the shell itself is attacked. The chemicals in the water then begin to dissolve the calcium carbonate of the shell.

During the growth of a mollusk, the periostracum often plays an important role. In the genus *Cymatium* the mollusk does not grow by increments, but extends its growth more than half a volution from its single preceding varix to the new aperture. The mollusk first deposits the periostracum and then thickens the growth with successive deposits of calcareous material on the inner surface. Perhaps this method of growth reduces the vulnerability of the mollusk as it grows and strengthens its shell.

Tony illustrated his talk with colored slides showing many types of periostracum. I think he gave us all a new understanding of this often ignored shell character.

Business Meeting:

Election of officers for 1985 was conducted. The new officers are as follows:

President	Martin Schuler	Recording Secretary	Barbara W. Myers
Vice President	Richard Herrmann	Corresponding Secretary	Dee Miller
Treasurer	Nola Michel		

The new officers will be installed at the Christmas party.

President Jules Hertz announced that the Club purchased a new slide projector which was used at the November meeting for the first time. Approval was given by the Executive Board to Carole Hertz, editor of The Festivus, to contact members of the scientific community to act as a review committee for The Festivus.

Bill Romer won the shell drawing.

Barbara W. Myers, Recording Secretary

THE ANNUAL CLUB CHRISTMAS PARTY - 1984

There was abundant good cheer among the old friends and new gathered for the Club's annual Christmas party in the gaily decorated Destroyer Room. After the cocktail hour, all were seated around the large table to enjoy together the dinner, toasts, and presentations. Outgoing President Jules Hertz thanked his board members and recounted some of the accomplishments of the Club in 1984. After Carole Hertz thanked those who had helped with The Festivus, Jules introduced charter member and Master of Ceremonies, John Souder. John reminisced about the beginnings and history of the Club and installed the officers for 1985. Following this the attendees were treated to a slide show history of the Club and its members as they appeared at parties from 1969 to the present. The carefully chosen pictures were greeted with much laughter and many comments. The traditional shell gift exchange concluded the festivities with many lingering to enjoy each other for a while longer.

FOR YOUR INFORMATION

Jeff Fried has given the San Diego Shell Club a considerable number of *Cypraea* specimens from his collection. The Club thanks Jeff for his generous donation.

Dues are due. Single membership $7.00; Family membership $8.00; Overseas (surface mail) $10.00. Make checks payable to San Diego Shell Club Inc., in care of the Club address or pay to treasurer, Nola Michel at the January meeting.

CHANGE OF ADDRESS. Schefter, Maria, Brentwood Suite 1415, 310 Woodward Ave., Saint John, NB E2K 2LI, Canada

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Meeting date: third Thursday, 7:30 P.M. Room 104, Casa Del Prado, Balboa Park

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PROGRAM

Richard Herrmann, Research technician and diver on the Kelp Invertebrate Project, University of Southern California, will speak on "Mollusks and Other Invertebrates off San Onofre Nuclear Generating Station." He will illustrate his talk with slides and mollusk specimens from the area.

Meeting date: 21 February 1985

CONTENTS

The Festivus welcomes all contributions which further the understanding of mollusks. Both popular and scientific articles are actively solicited. At this time The Festivus does not publish descriptions of new taxa.

Publication date: The publication date of The Festivus appears on the masthead above. The Festivus is published monthly except December.

BIOLOGY OF THYCA CALLISTA (GASTROPODA: CAPULIDAE)

BY

HANS BERTSCH

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Articles in recent issues of The Festivus have detailed the search for the elusive *Thyca callista* Berry, 1959, a gastropod ectoparasitic on the arms of asteroids. Bratcher (1984) reported finding the Indo-Pacific *Thyca crystallina* (Gould, 1846), but never having collected its Panamic congener. Later, Helen DuShane (1984) told her fortuitous "fishing story," having collected *T. callista* from a sea star on a fisherman's hook in Bahía Escondido, Baja California Sur, Mexico. At the risk of repetition, perhaps one more *Thyca* tale is appropriate.

My experiences with *Thyca* began over a decade ago when I was a visiting investigator at the Smithsonian Tropical Research Institute in Panama. Dr. Gordon Hendler, then staff biologist and echinoderm expert at the Galeta Marine Laboratory, showed me two specimens of *Phataria unifascialis* (Gray, 1840) on which were attached specimens of *Thyca callista*. He had collected them at Taboguilla Island (17 m deep), in the Bay of Panama, and gave them to me for further study (Bertsch, 1975a).

One *Thyca* (10.5 mm long) had a smaller *Thyca* (approximately 3 mm long) underneath it. The small male lives completely covered and protected by the large female's shell. The male probably obtains nourishment from the respiratory water currents of the female. The female penetrates her proboscis through the skin of the sea star host. Lacking a radula, she sucks fluids and nourishment from her "landlord."

The sculpture of the body whorl of the male is different from the female's (Figure 1). The small male shell (Figure 2) has prominent spiral rather than axial ridges. It is not known if this species is a protandric hermaphrodite and if the axial sculpturing develops as the animal increases in size. Berry's (1959:110) original description of the larval shell reads: "3 whorls, solid, smooth, porcelaneous bulimuliform, flatly, ventrally embedded in the nonspiral body-whorl in oblique reverse to the subsequent axis." The shape is clearly illustrated in the accompanying scanning electron micrograph (Figure 2).

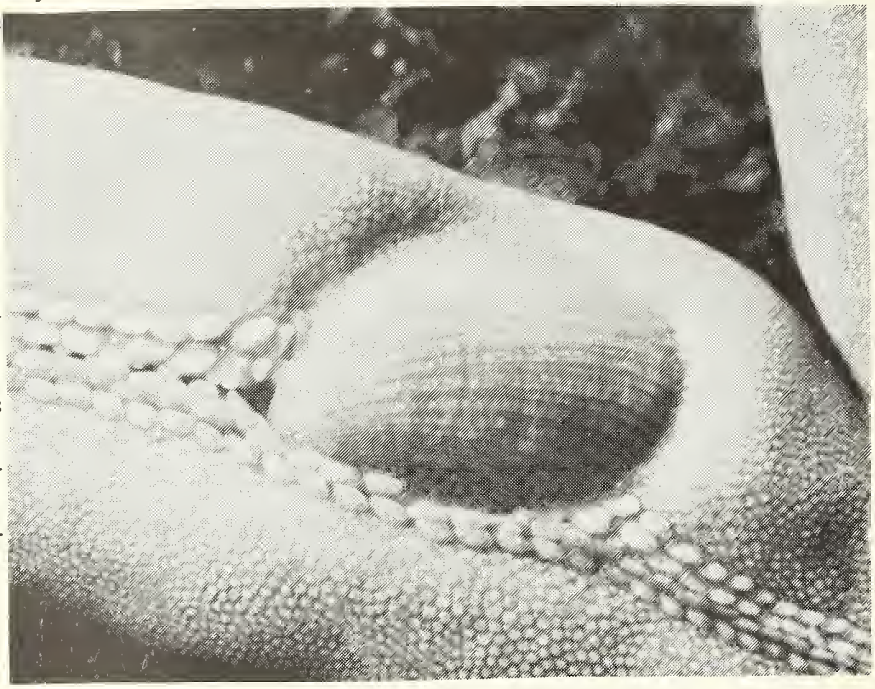

Fig. 1. In situ underwater photograph of the larger female shell of *Thyca callista* (illustrated specimen, 13.5 mm long) on *Phataria unifascialis;* Punta Prieta, Mulege (6 m deep); 19 October 1984; H. Bertsch photo.

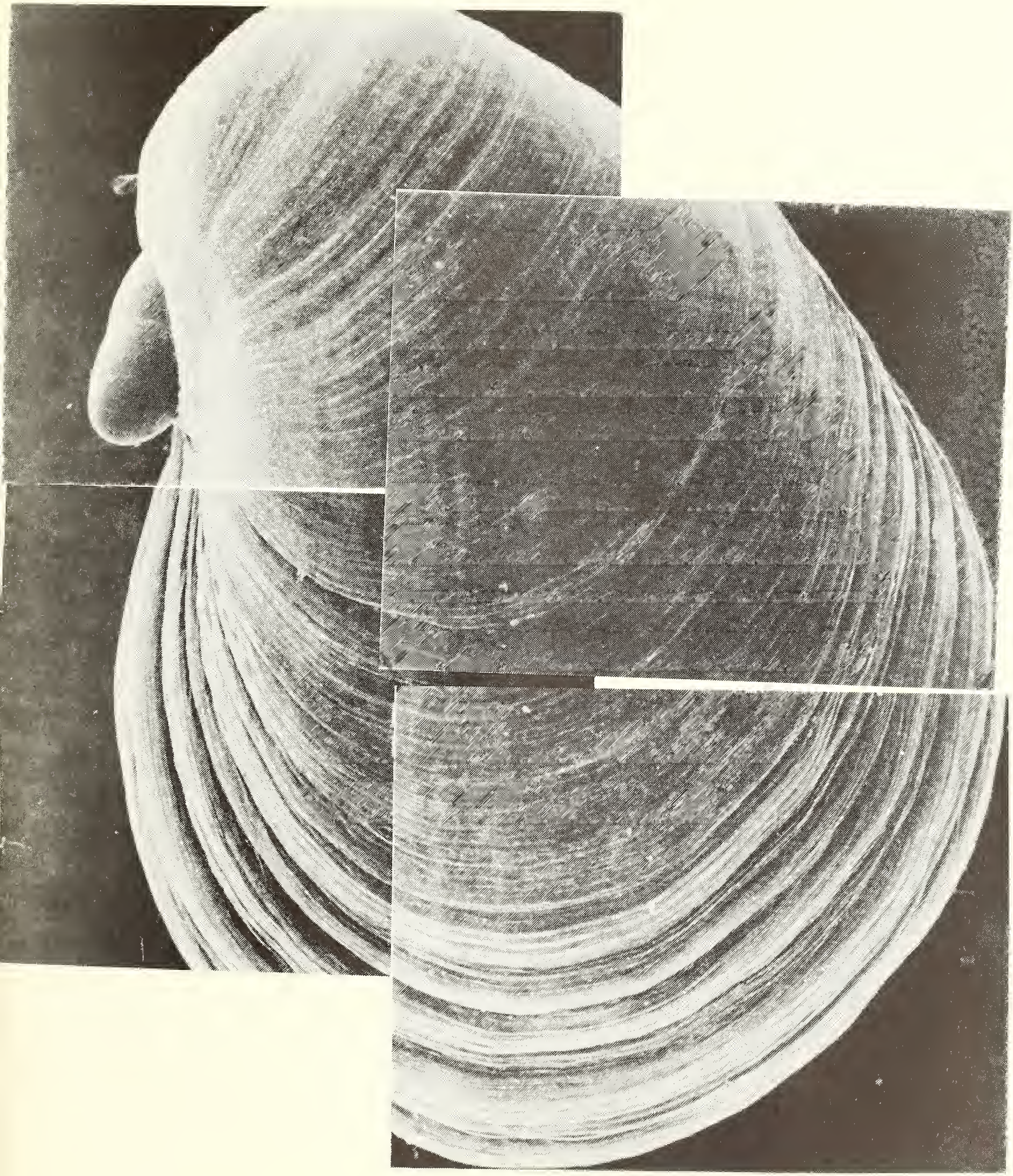

Figure 2. Scanning electron micrograph of the small (3 mm) male shell of *Thyca callista*. Micrograph of Panamanian specimen by H. Bertsch.

I have already published color photographs of *Thyca callista* on its sea star host (Bertsch, 1975b, and 1984a), including a close-up of the flesh of the sea star showing the tissue damage where the gastropod had been attached. One sea star even had two large female *Thyca* on a single arm!

The known distribution of *Thyca callista* (summarized in Bertsch, 1975a) is from Guaymas, Sonora; from various localities between Isla Cerralvo and Cabo San Lucas, Baja California Sur; Mazatlán, Sinaloa; Isla Maria Madre, Nayarit; Banderas Bay, Jalisco (all Mexico); and the Bay of Panama. During the past year, I went on numerous research expeditions to the Baja California peninsula, including participating in a preliminary zoogeographical survey of the coasts of Baja California Sur with the California Academy of Sciences invertebrate zoology staff (Bertsch, 1984a and 1984b). In addition to looking for nudibranchs and their prey, I searched for crustacean ectosymbionts and molluscan ectoparasites. I found *Thyca callista* on *Phataria unifascialis* at Bahía Las Cruces (24°13' N; 110°04' W), 8 miles south of Loreto (25°55' N; 111°21' W), and Punta Prieta, Mulege (26°55' N; 111°58' W) (on 14 January, 25 January, and 19 October 1984 respectively). The latter two records are especially significant, since they represent the northernmost reported occurrence of *Thyca callista* on the eastern coast of Baja California Sur. The range of *T. callista* is throughout the southern half of the Gulf of California to Panama.

ACKNOWLEDGMENTS

I am grateful to Luis Aguilar Rosas, Dr. Gordon Hendler, Dr. Michael T. Ghiselin, Dr. Terrence M. Gosliner, Dr. Welton Lee, Robert Van Syoc, and David Catania for field assistance. Funding for work in Mexico was supplied in part by a grant from the George Lindsay Field Research Fund (CAS).

LITERATURE CITED

BERRY, S. STILLMAN

1959. Notices of new eastern Pacific Mollusca--III. Leaflets in Malacology 1(18): 107-113.

BERTSCH, HANS

1975a. New data on *Thyca callista* (Gastropoda: Capulidae). The Veliger 18(1): 99-100, 1 text fig.

1975b. A snail that eats sea stars. Sea Frontiers 21(5):281-282; 2 text figs.

1984a. An international reconnaissance expedition to Baja California Sur, Mexico: Part I. Shells and Sea Life 16(10):182-184, 5 text figs.

1984b. An international reconnaissance expedition to Baja California Sur, Mexico: Part II. Shells and Sea Life 16(11):206-209; 6 text figs.

BRATCHER, TWILA

1984. *Thyca*. The Festivus 16(9):93; 1 text fig.

DUSHANE, HELEN

1984. *Thyca (Bessomia) callista* Berry, 1959. The Festivus 16(11):124-125.

REDESCRIPTION OF MUREX INTERSERRATUS G. B. SOWERBY II, 1879

BY

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ABSTRACT

We are recognizing as the holotype of *Murex interserratus* G.B. Sowerby II, 1879, the specimen in the Museum National d'Histoire Naturelle, Paris, France. This specimen was purchased from Sowerby in 1879, the year he described this species.

INTRODUCTION

At the time the senior author was engaged with the late George E. Radwin in the preparation of MUREX SHELLS OF THE WORLD (Radwin & D'Attilio, 1976), Dr. Tadashige Habe generously donated several muricid species to the San Diego Natural History Museum for our study and use. Included in the material were three specimens from Sagami Bay, Honshu, Japan, erroneously labelled *Murexsul cirrosus* (Hinds, 1844). From one specimen of "cirrosus," the radula was prepared and detailed drawings made. The radula is related to that of *Murexsul octogonus* (Quoy & Gaimard, 1833), the type of the genus as figured in Ponder (1968). However, the rachidian plate is broader than that of *M. octogonus* and shows slight differences in the size of the cusps. In addition, there are two to three folds ending in minute points between the lateral cusps and the end point of the radula that are lacking in *M. octogonus*.

Examination of the type of *Murex cirrosus* Hinds, 1844, borrowed from the British Museum (Natural History) together with newly collected material dredged in the Philippine Islands in the last decade, enabled D'Attilio (1981) to clarify and illustrate *M. cirrosus* and determine its placement in the genus *Favartia* Jousseaume, 1880.

Subsequently, in the pursuit of the identification of *Murex interserratus* Sowerby, 1879 we found, in the Museum National d'Histoire Naturelle, Paris, a specimen of *Murex interserratus* marked "syntype." We borrowed this single specimen that had been purchased from Sowerby in 1879, the year he described *M. interserratus*. The identifying label is considered to be in Sowerby's handwriting. Apparently Sowerby did not designate this specimen as the holotype and gave no dimensions or locality. Sowerby's original figure is reproduced in Fair (1976) with a translation of the original description. Sowerby's comment following the original description seems to indicate he had only the one specimen: "Although small and possibly immature, there is a distinctive character about this shell..." We understand from Dr. Philippe Bouchet of the Museum National d'Histoire Naturelle, that there are no other specimens of *M interserratus* considered type material in the British Museum (N.H.) (in litt.). We are therefore recognizing the specimen in the Paris museum as the holotype.

After comparing the three specimens from Sagami Bay, Japan, given to us by Dr. Habe with the type of *M. interserratus*, it is our opinion that these are conspecific.

SYSTEMATIC ACCOUNT

FAMILY: Muricidae Rafinesque, 1815
SUBFAMILY: Muricopsinae Radwin & D'Attilio, 1971
GENUS: *Murexsul* Iredale, 1915. (Type by original designation: *Murex octogonus* Quoy & Gaimard, 1833)

MUREXSUL INTERSERRATUS (Sowerby, 1879)

Figures 1 - 7

Murex interserratus Sowerby, 1879, Thes. Conch., v.4, *Murex* p. 39, fig. 204
Murexsul cirrosa (Hinds), Habe, 1961, Shells of Japan, p. 50, pl. 25, fig. 9 (not *Murex cirrosus* Hinds, 1844)
Murexsul cirrosa (Hinds), Habe, 1964, Shells of the Western Pacific v. 2, p. 79, pl. 25, fig. 9 (not *Murex cirrosus* Hinds, 1844)
Murexsul cirrosus (Hinds), Kuroda *et al.* 1971, Seashells of Sagami Bay, p. 141, pl. 41, fig. 9 (not *Murex cirrosus* Hinds, 1844)

Description: The shell is moderately fusiform with spire elevated and has four postnuclear whorls. The whorls are angulate with the area above the angulate portion somewhat tabulate. The aperture is subcircular, the inner lip not erect, and the canal broad posteriorly, moderately long, open and tapering. The suture is impressed. The protoconch is white and of 1½ smooth rounded whorls. There are seven varices with low lamellae on the leading side and an open, short spine elevated posteriorly at the shoulder. The varices cross the shoulder obliquely and terminate at the suture. There are one to two minor scabrous cords at the suture. Below the heavy cord forming the shoulder angle there is a single scabrous major cord. There are five cords on the body with intercalary cords between each major cord and two spines on the canal with no indication of cords. There are one or two poorly developed spines between the suture and the shoulder spine. Eight varices occur on the penultimate whorl with nine to ten varices on earlier postnuclear whorls.
Dimensions: 12.5 x 7 mm
Color: The shell is a dull gray white.

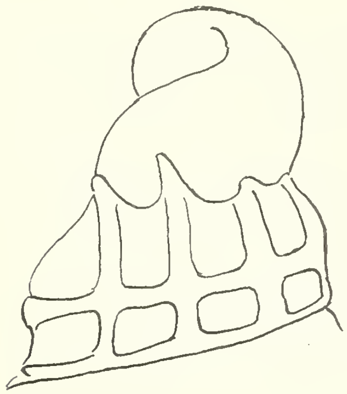

Fig. 5. Detail drawing of the protoconch of the holotype of *Murexsul interserratus*.

Fig. 6. Detail drawing of the protoconch of *Murexsul interserratus*. Specimen A. SDNHM 62612

DISCUSSION: Comparison of the type of *M. interserratus* and the three specimens of this species collected at Sagami Bay, Honshu, Japan (SDNHM 62612 A-C) demonstrates the following divergent characters: The largest specimen (A) is 16.9mm in length x 8.5 mm in width, has four postnuclear whorls and a protoconch of 1½ whorls. There are six major cords on the body and very weak intercalary cords. There is a second row of spines present on the shoulder between the shoulder spines and the suture. This specimen has ten varices. Specimen B is 15.1 x 7.5 mm It also has four postnuclear whorls, but the varices on the body whorl number eleven. This specimen has five cords on the body and no second set of spines on the shoulder as in specimen A. Specimen C is 13.2 x 7.2 mm, has four postnuclear whorls, eight varices and the spines at the shoulder are recurved and turned to-

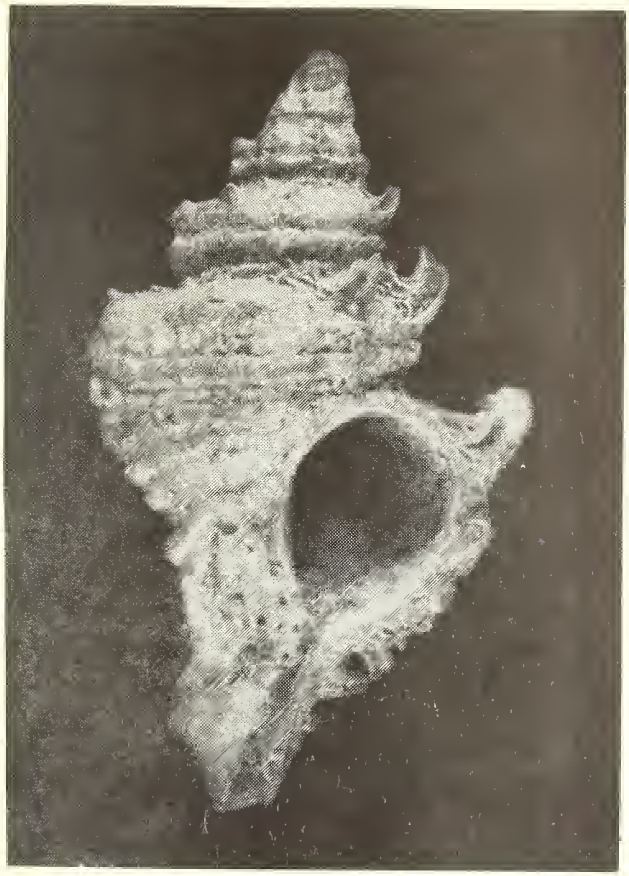

Fig. 1. Apertural view of holotype of *Murexsul interserratus* (Sowerby, 1879). 12.5 mm x 7 mm.

Fig. 2. Dorsal view of holotype of *Murexsul interserratus*.

Fig. 3. Apertural view of *Murexsul interserratus* Specimen A. 16.9 mm x 8.5 mm. SDNHM 62612.

Fig. 4. Dorsal view of specimen shown in Figure 3.

wards the spire. The number of varices are nine to eleven on the Sagami Bay specimens, consistently more than the type which has seven. There are five to six major cords and one specimen (A) has a row of spines between the shoulder and the suture. All the Sagami Bay specimens not only form tubercular spines at the shoulder but also short tubercular spines are formed on the spiral cords at each varix on the body whorl.

A species congeneric but of larger size and specific distinction is *Murexsul multispinosus* (Sowerby III, 1904), which attains a size of about 30 mm. *Murexsul azami* (Kuroda, 1929) is a junior synonym.

Comparison of *Murexsul interserratus* with the original figure and description of *Murexsul zonatus* Hayashi & Habe, 1965 shows a very close relationship, but *M. zonatus* has a protoconch of two whorls and has seven postnuclear whorls. There are seven to nine varices on the body whorl and the spiral cords form short spines at the varices. The color is white with a broad brown band below the suture and two narrow brown bands on the base of the body whorl.

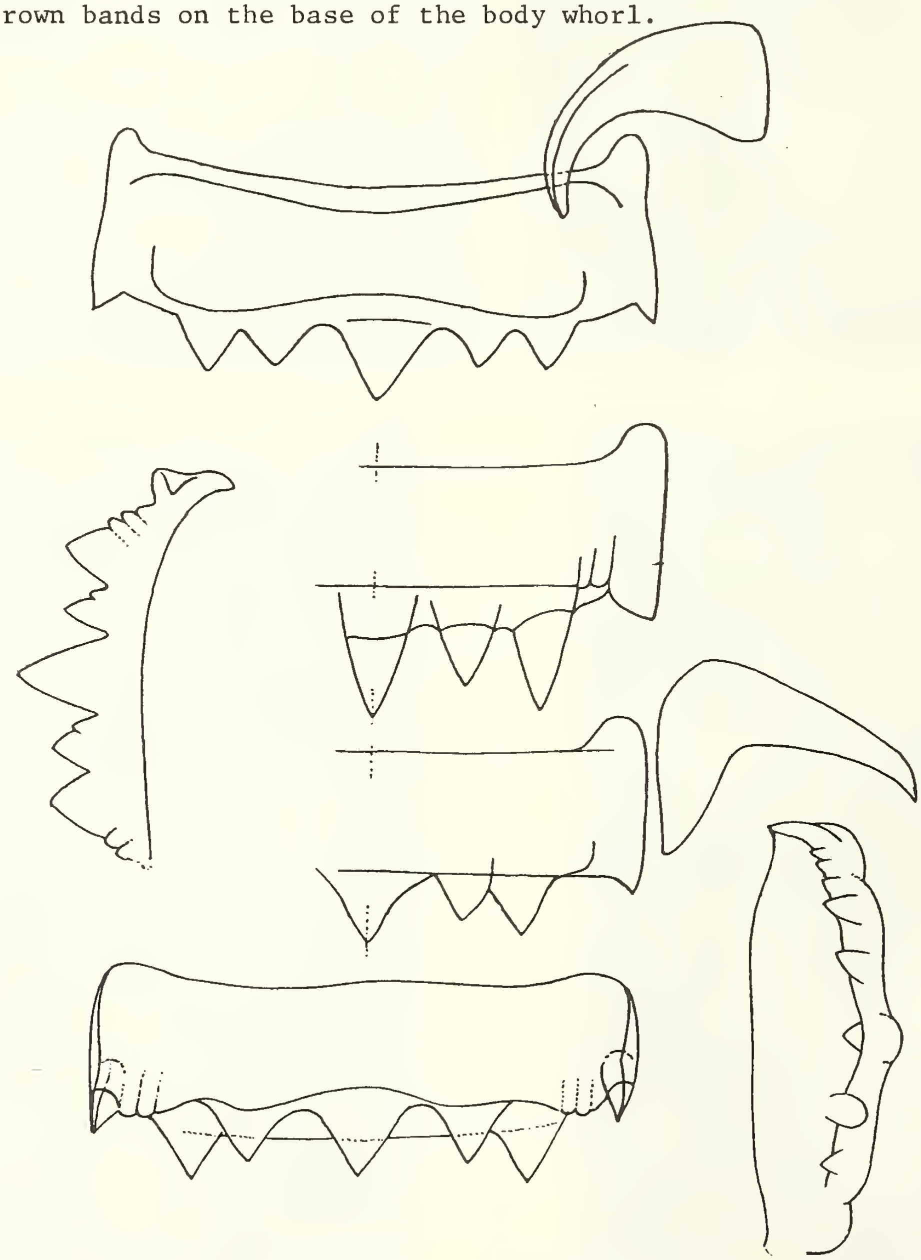

Fig. 7. Detail drawing of the radula of *Murexsul interserratus*. SDNHM 62612.

ACKNOWLEDGMENTS

We wish to thank Dr. Tadashige Habe of Tokai University, Shimizu, Japan, for generously donating the three specimens from Sagami Bay used in this study. We are grateful to Dr. Philippe Bouchet of the Museum National d'Histoire Naturelle in Paris, France for the loan of the holotype of *Murex interserratus* Sowerby, 1879, The late Dr. George E. Radwin prepared the radula of one of the specimens from Sagami Bay. Further, we wish to thank David K. Mulliner for the photographs used in this paper.

LITERATURE CITED

D'ATTILIO, A.
1981. The rediscovery of *Murex cirrosus* Hinds, 1844. The Festivus 13(4): 46-51

FAIR, R.
1976. THE MUREX BOOK: an illustrated catalogue of Recent Muricidae (Muricinae, Muricopsinae, Ocenebrinae). R. Fair. Honolulu, 138pp., 23 pls.

HABE, T.
1961. COLOURED ILLUSTRATIONS OF THE SHELLS OF JAPAN. Osaka, Japan. 183 pp. 66 pls.
1964. SHELLS OF THE WESTERN PACIFIC IN COLOR. vol. 2. Osaka, Japan. 233 pp., 66 pls.

HINDS, R.F.
1844. The zoology of the voyage of H.M.S. Sulphur. vol. 2, 72 pp., 21 pls.

HAYASHI, S., & T. HABE
1965. Descriptions of four new gastropodous species from Enchunada, Honshu. Venus 24(1):10-15, 1 pl.

IREDALE, T.
1915. A commentary on Suter's Manual of New Zealand Mollusca. Trans. N. Zealand Inst. 47:417-497.

JOUSSEAUME, F.
1880. Division méthodique de la famille des purpurides. La Naturaliste 42: 335-336.

KURODA, T.
1929. Notes and descriptions of some new and noteworthy species from Tateyama Bay in the report of Mr. T. Fujita. Venus 1(3)93-97, pl. 3 (Appendix)

__________, T. HABE & K. OYAMA
1971. THE SEASHELLS OF SAGAMI BAY. English Section. Tokyo. 489 pp., 121 pls.

PONDER, W.F.
1968. Nomenclatural notes on some New Zealand rachiglossan gastropods with description of five new species. Records Dominion Mus. Wellington 6(4):29-47.

QUOY, J.R.C. & J.P. GAIMARD
1833. Voyage de decouvertes de l'Astrolabe, Paris. Zoologie, Mollusca II, pp. 321-686

RADWIN, G.E. & A. D'ATTILIO
1971. Muricacean supraspecific taxonomy based on the shell and radula. The Echo 4:55-67, 20 figs.
1976. MUREX SHELLS OF THE WORLD, AN ILLUSTRATED GUIDE OF THE MURICIDAE. Stanford Univ. Press. 284 pp., 32 pls., 198 figs.

RAFINESQUE, C.S.
1815. Analyse de la nature ou tableau du univers et des corps organises. Barravecchia, Palermo.

SOWERBY, G.B. II
1879. Thes. Conchyl. vol. 4, *Murex*. London. 55 pp., pls. 380-402.
SOWERBY, G.B. III
1904. Descriptions of *Dolium magnificum, n. sp.*, and *Murex multispinosus*, n. sp.. Proc. Malac. Soc. London 6:7-8, 2 figs.

EXCERPTS FROM THE 1985 TIDE CALENDAR FOR THE NORTHERN GULF OF CALIFORNIA

The entries listed here will show only periods of low tides of -4.0 feet and below. The tidal measurements, in this calendar prepared by The Department of Ecology and Evolutionary Biology, University of Arizona, are for Puerto Peñasco and are given in Mountain Standard Time. To correct for San Felipe, subtract one hour from listed times (San Felipe is on Pacific Standard Time). For Bahía de Los Angeles, add 15-30 minutes to calendar predictions (the amplitude at Bahía de Los Angeles is about one-half of calendar measurements). Tides at Santa Rosalia and Guaymas cannot be estimated using this calendar. [Interpretation of tide calendar is approximate].

February
3. -3.9 at 6:15 P.M.
4. -4.9 at 7:30 P.M.
5. -5.9 at 8:15 P.M.
6. -5.5 at 9:00 P.M.
7. -4.3 at 10:00 P.M.

March
4. -4.0 at 7:00 P.M.
5. -5.7 at 7:30 P.M.
6. -3.5 at 8:15 A.M.
-6.0 at 8:00 P.M.
7. -4.0 at 8:30 A.M.
-5.9 at 8:30 P.M.
8. -4.7 at 9:00 A.M.
-4.8 at 9:00 P.M.
9. -4.5 at 9:30 A.M.
10. -4.0 at 10:00 A.M.

April
3. -4.5 at 7:30 P.M.
4. -4.5 at 7:30 A.M.
-5.0 at 8:00 P.M.
5. -5.9 at 8:30 A.M.
-5.0 at 8:30 P.M.
6 -6.0 at 9:00 A.M.
-3.9 at 9:30 P.M.
7. -5.9 at 10:00 A.M.
-4.3 at 9:45 A.M.

May
2. -4.0 at 6:15 A.M.
-3.8 at 6:15 P.M.
3. -6.0 at 7:00 A.M.
-4.0 at 7:00 P.M.
4. -6.3 at 8:00 A.M.
-3.9 at 8:15 P.M.
5. -6.4 at 8:30 A.M.
6. -6.0 at 9:00 A.M.
7. -4.2 at 9:30 A.M.

June
1. -4.3 at 6:15 A.M.
2. -5.5 at 6:00 A.M.
3. -5.0 at 7:00 A.M.
4. -4.3 at 8:00 A.M.

July
1. -4.2 at 7:00 A.M.
2. -4.1 at 7:30 A.M.
3. -4.0 at 8:15 A.M.

August
17. -4.0 at 8:15 A.M.

September
14. -4.1 at 7:30 A.M.
15. -4.3 at 8:30 A.M.

October
12. -4.0 at 6:30 P.M.
13. -4.1 at 7:30 P.M.
14. -4.9 at 8:15 P.M.
15. -4.2 at 9:00 P.M.

November
10. -4.0 at 6:30 P.M.
11. -5.5 at 7:00 P.M.
12. -5.9 at 7:45 P.M.
13. -5.7 at 8:00 P.M.
14. -4.0 at 8:30 P.M.

December
9. -4.2 at 6:00 P.M.
10. -5.0 at 6:30 P.M.
11. -5.8 at 7:00 P.M.
12. -5.1 at 8:00 P.M.
13. -4.3 at 8:30 P.M.

IN MEMORIAM

It is with sadness that we report the passing of Ruth Purdy on 2 December 1984. Ruth was a longtime member of the San Diego Shell Club and an active one for many years. She was very generous in lending specimens from her fine collection to malacologists. *Murex purdyae* Radwin & D'Attilio, 1976 and *Terebra purdyae* Bratcher & Burch, 1970 were named for her. Ruth's home was a gathering place for shell enthusiasts. It was her joy to have them there and they were treated with the Purdy hospitality. She will be missed by her many friends around the world.

THE BERRY COLLECTION GOES TO THE SANTA BARBARA MUSEUM

The entire mollusk collection and library of the late S. Stillman Berry will be transferred to the Santa Barbara Museum of Natural History where they will be permanently housed. His private library is probably unsurpassed in this country and his eastern Pacific mollusk collection one of the most important.

All mollusk specimens listed in "Illustration of the Types Named by S. Stillman Berry in his 'Leaflets in Malacology'" by Carole M. Hertz as being in "Redlands" (with a Berry collection number) will soon be in the collection of the Santa Barbara Museum of Natural History.

CLUB NEWS

FOR YOUR INFORMATION

The Annual Auction/Potluck will be held on 20 April 1985. The Club is seeking a "home" for this year's auction. If you can host this event, please notify Marty Schuler at 274-6541. It is not too early to prepare your shell donations. Please bring them to the Club meeting or, if out of town, send to the Club address.

Volunteers are needed to serve on the telephone committee. If you are willing to help with phoning for Club events (not monthly meetings), please contact Marty Schuler.

The Club will again participate in the Greater San Diego Science and Engineering Fair to begin on 10 April 1985. The Club judges are Martin Schuler, Chairman; Barbara W. Myers; Carole M. Hertz; and alternate, Jules Hertz.

The 48th Annual Annual Sanibel Shell Fair will be held from March 7-10, 1985. For further information write to Ralph Moore, E2, 1214 Gulf Drive, Sanibel , FL 33957.

FROM THE MINUTES - SAN DIEGO SHELL CLUB MEETING - 17 JANUARY 1985

Dr. Hans Bertsch, our lecturer for January, spoke on opisthobranch zoogeography and evolutionary ecology along the Baja California coast. The first part of his talk concerned the geographical factors of the Baja Peninsula. He defined the Californian Province as well as the Panamic Province and described the overlap of the two areas. The second part of his talk concerned the faunal composition of the Panamic Province which includes some Indo-Pacific and Caribbean species. In the third segment he discussed evolutionary ecology, the feeding habits of several species, and their radular adaptation to a particular prey.

Dr. Bertsch's presentation captured the rugged splendor of Baja and contrasted it with the delicate beauty of the animals he studied. The color combinations and designs of the nudibranchs are exquisite, but I was equally impressed by the camouglage evidenced by some species shown *in situ*.

David K. Mulliner showed the slides he took at the Club Christmas Party and everyone enjoyed the candid pictures of themselves and others.

Our new President, Martin Schuler announced that David K. Mulliner would serve as Parliamentarian and Margaret Mulliner and Barbara Myers as Librarians Ian Hamilton volunteered to head the Phone Committee and also to act as Host for the meetings. Wes Farmer agreed to be the Botanical Garden Foundation Representative. The annual Auction/Potluck will be Saturday, April 20th. A home is needed for the event. Please begin to bring your donations to the February meeting or contact a board member to arrange for pickup

Barbara W. Myers, Secretary

THE FESTIVUS
A publication of the San Diego Shell Club

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MEMBERSHIP AND SUBSCRIPTION

Annual dues are payable to San Diego Shell Club. Single member: $7.00; Family membership: $8.00; Overseas (surface mail): $10.00
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Single copies of this issue: $5.00. Postage is additional.
Meeting date: third Thursday, 7:30 P.M. Room 104, Casa Del Prado, Balboa Park

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PROGRAM

Tim Herrlinger, a marine biologist at USC, will discuss Predator/Prey Relationships in the Kelp Forest. He will accompany his talk with slides.

Meeting date: 21 March 1985

Annual Auction/Potluck: 20 April 1985. See page 36.

CONTENTS

The Festivus welcomes all contributions which further the understanding of mollusks. Both popular and scientific articles are actively solicited. At this time The Festivus does not publish descriptions of new taxa.

Publication date: The publication date of The Festivus appears on the masthead above. The Festivus is published monthly except December.

A NOTE ON THE GEOGRAPHICAL DISTRIBUTION OF FAVARTIA (CARIBIELLA) PURDYAE VOKES & D'ATTILIO, 1980 (ANOTHER SPECIES NAMED FOR RUTH PURDY)*

BY

ANTHONY D'ATTILIO

Department of Marine Invertebrates, San Diego Natural History Museum, Balboa Park, P.O. Box 1390, San Diego, California 92112

To the list of molluscan species named for the late Ruth Purdy [Festivus XVII (2):22] is *Favartia (Caribiella) purdyae* Vokes & D'Attilio, 1980 (Figure 1). The circumstances surrounding the naming of this species are of some interest because they cast some light on the character of Ruth with whom I had corresponded for about ten years before coming to California in 1969. Our friendship continued thereafter.

Before I came to live in California, I (as well as many others in the United States) had corresponded with Jacqueline De Roy and Carmen Angermeyer, both residents (with their families) of Academy Bay, Isla Santa Cruz, in the Galápagos Islands. The material sent from there by both Mrs. De Roy and Mrs. Angermeyer proved to be a rich source of species previously unknown to science. Among the many species sent to me by Mrs. De Roy were specimens of a *Favartia* species which, for some reason or other, I did not recognize as new and to which I showed no further interest.

When I disposed of my worldwide shell collection, I sold the large, fine collection of Galapagan shells to Dr. Donald R. Shasky. I knew that one or two of the muricid specimens were puzzles; but with the shells no longer in my possession, I simply put them out of my mind.

More than a dozen years later, I received a letter from Dr. Emily Vokes who suggested I look at a specimen of *Favartia* from the Galapagos that she believed was undescribed. The specimen had been sent to her by Ruth Purdy (apparently the only one in her collection) who doubted its identification as *Aspella indentata*. Until studied very carefully this unidentified Galapagan species was thought to be a form of *Favartia erosa* (Broderip, 1833) from the Galápagos (Figure 2). This reminded me, after this long period of time, that I'd had, in my collection, about six or seven examples of this species received from the Galápagos. At my request, Dr. Shasky very kindly placed the lot at my disposal, thus giving us more than a single specimen with which to work.

Credit goes to Ruth for questioning the identity of this species, years after its receipt from Academy Bay. She was a keen and avid student of the eastern Pacific tropical mollusks and was always ready and pleased to supply study specimens either on loan or as gifts to her friends near and far.

Because many *Favartia* species are very small, their distinctive traits are not always easy to assess. By placing a small species, such as *Favartia*, under a microscope and making a careful camera lucida enlargement, one is forced to note its minute details of structure. And with the careful use of good illumination, the resulting shading enhances the nature of its form: this is especially true if the light source is moved in several directions to bring out every facet of areas depressed or elevated. It was in this way that careful illustrations

*Editor's note: The name *Favartia (Caribiella) purdyae* was inadvertently omitted in the memorial notice in The Festivus.

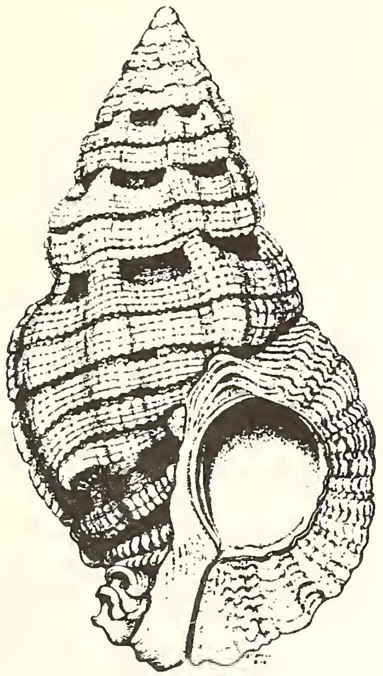

Figure 1

Favartia (Caribiella) purdyae Vokes & D'Attilio, spec. nov.

Fig. 1. *Favartia (Caribiella) purdyae*
Courtesy of The Veliger

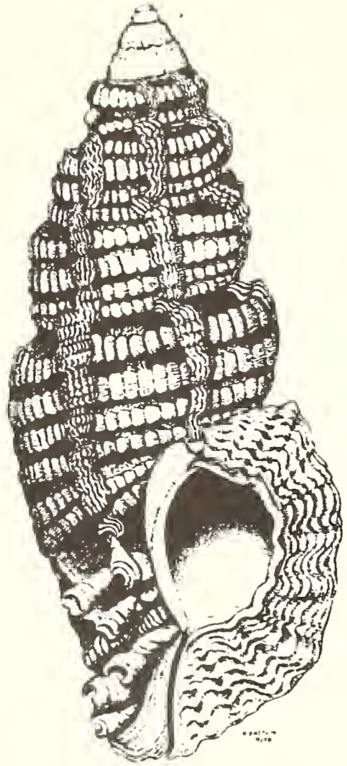

Figure 2

Favartia (Caribiella) erosa (Broderip)

Fig. 2. *Favartia (Caribiella) erosa*
Courtesy of The Veliger

were made of both *Favartia erosa* and the then new species. The illustrations were then inked in for linecut reproduction. Though much reduced in the published text, their integrity was retained. I cannot stress strongly enough the enhanced concept of the morphology of small shells when studied and drawn as I have suggested.

Favartia (Caribiella) purdyae was proposed in The Veliger, volume 23(1):15-18, in a paper entitled, "A New Species of *Favartia (Caribiella)* from the Galápagos Islands." The species is figured here courtesy of The Veliger. Interestingly, this species, known only from the Galápagos at the time of its proposal, has been collected at Cocos Island, Costa Rica by Dr. Donald R. Shasky and Mr. Gene Everson in March 1984. Three specimens were collected at this time in depths ranging from 35 to 85 feet under coral and rocks at Isla Cáscara, Isla Manuelita, and Roca Sucia, Cocos Islands. The Cocos Islands specimens are on loan at the San Diego Natural History Museum at this time and extend the known distribution of *F. purdyae*.

COMMENTS ON SOME JUVENILE SOUTHERN CALIFORNIAN MOLLUSCS

BY

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Adapted from a paper presented at the annual meeting of the Western Society of Malacologists -- 1984

When I first started to study micro-molluscs, immature specimens seemed like some special form of torment. In spite of the problems in identification, I've become extremely interested in the study of these minute specimens and in how they differ from the more familiar adults. I'll discuss twelve examples of micro-molluscs collected from Santa Cruz Island. Most of them are common along the mainland Southern California coast as well.

In discussing the larval shell, I am following the terminology used in Jablonski & Lutz (1980). In Figure 1, the embryonic shell (at the top) is labeled protoconch I (PI). It varies from about one half to two whorls and looks very smooth and glassy. Under high magnification, a granular texture can be seen. This is apparently a result of the mechanics of shell deposition, which is done at this stage by a gland in the embryo mollusc. The second part of the protoconch, called protoconch II (PII), is deposited by the mantle edge of the animal during the veliger stage. Protoconch II may vary from one and a half to eight smooth or ornamented whorls. The term larval shell refers to these two stages of growth and is synonymous with the term protoconch. All subsequent growth is called the teleoconch.

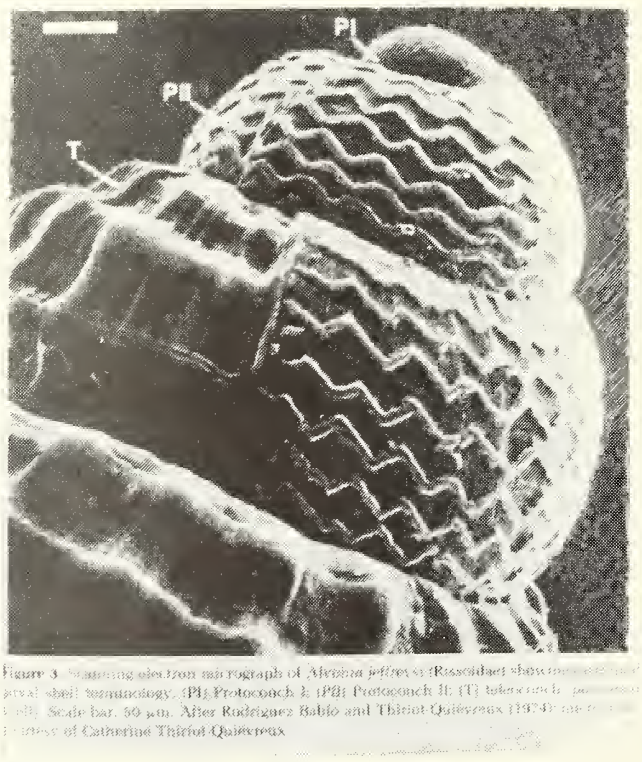

Fig. 1. From Jablonski & Lutz (1980), scanning electron micrograph illustrating gastropod shell terminology.

Larval shell terminology for bivalves (Figure 2) corresponds to that of gastropods, except the term prodissoconch is used instead of protoconch. Although the two stages in prodissoconch growth can often be distinguished, there isn't the diversity of ornamentation found in gastropods.

Juvenile molluscs, those in the immature stage of the teleoconch, often lack some basic feature that is diagnostic of the adult species. For instance, the early juvenile stage of all abalone, keyhole limpets, and *Sinezona* (tiny slit shells) lack the holes characteristic of the adult. *Haliotis cracherodi* Leach,

1814 shown in Figure 3 exhibits, at about two centimeters, many of its adult features. It already has holes in the top of the shell, an enlarged body whorl, and a larval shell much thickened and eroded. However, this specimen still has juvenile coloration of pink, white, and dark brown. At about two centimeters, the youthful pinks and whites give way to the sober tones of the adult. The adults often live in the open, but juveniles can be very hard to find because they seek out narrow, deep cracks. Only gradually, as they get larger do they move out among the adults (Figure 4).

Chama arcana Bernard, 1976 shown in Figure 5, is an example of a different sort of color change. Most prodissoconchs are white or colorless; so I was delighted to discover that this common species has a rosy pink prodissoconch. It is all the more striking because the shell is all white in tiny specimens (small teleoconchs) I have seen, lacking the red banding that

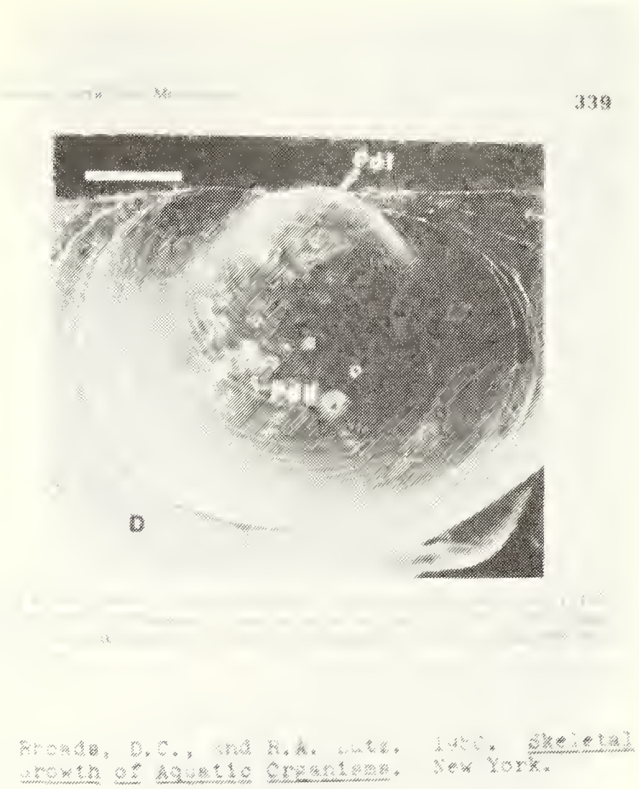

Fig. 2 From Jablonski & Lutz (1980), scanning electron micrograph illustrating bivalve shell terminology.

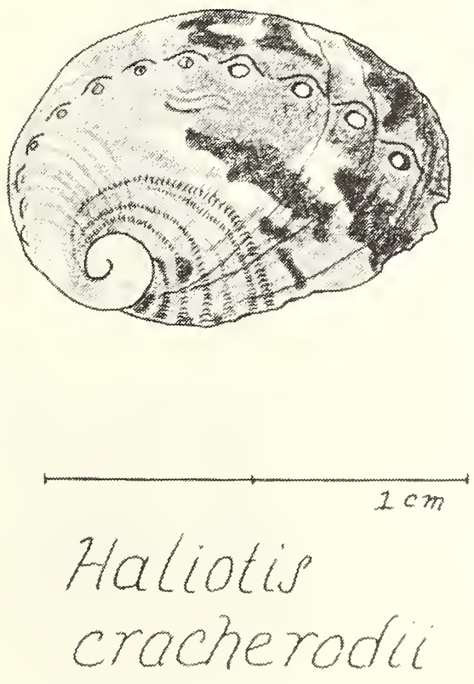

Fig. 3. Drawing of two centimeter specimen of *Haliotis cracherodi*.

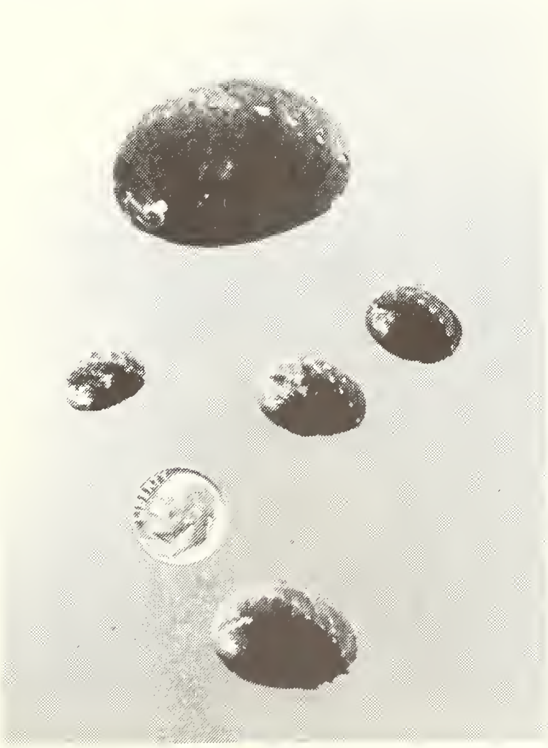

Fig. 4. Specimens of *H. cracherodi*.

often colors adults. Of still further interest is the distinctive section of juvenile growth before the adult frills start. This is a well defined area just below the beaks with regular concentric and radial sculpture. The development of the frills is quite variable and in a 1 mm long specimen there is already quite a bit of deformation. The frills are short, but sometimes, even at this small size, can be quite developed and showy. Figure 6 is a small specimen of *C. arcana*.

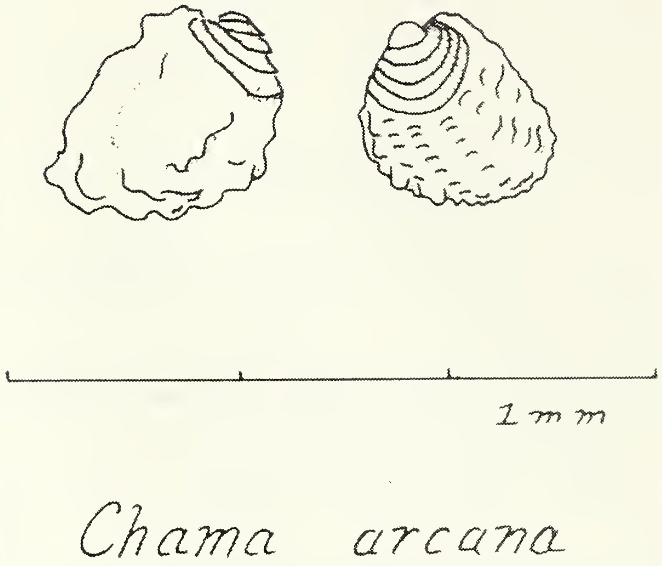

Fig. 5. *Chama arcana* showing the beginning of the development of frills.

Fig. 6. A small specimen of *Chama arcana*.

Color changes of yet another sort occur in the Calyptraeidae. *Crepidula perforans* (Valenciennes, 1846) (Figure 7) is one of the common slipper shells that lives under rocks, inside empty pholad burrows, and in the apertures of empty gastropod shells. The specimen illustrated here is from an empty black turban shell, *Tegula funebralis* (A. Adams, 1855), that had been taken over by a hermit crab. These *Crepidula* are very thin and recurved to fit the inside of the shell. It is not uncommon to find very small juveniles farther inside the shell, filling the aperture. The larval shell of *Crepidula perforans* is connected to the shelf and surrounded by new shell material but not thickened or absorbed. See Figure 8. In larger shells there is no evidence of the larval shell. See Figure 9.

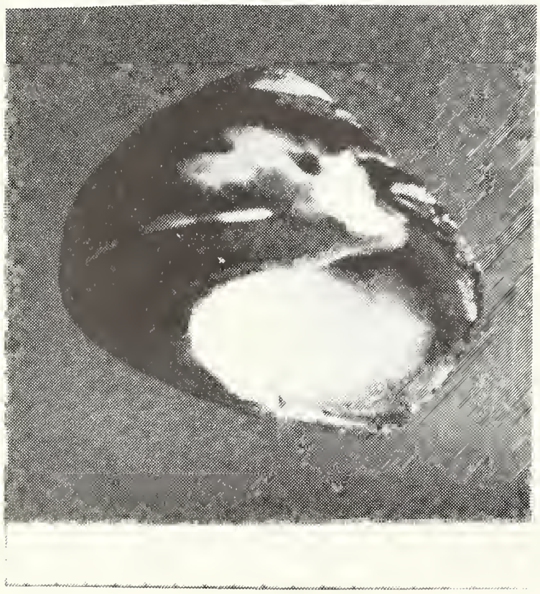

Fig. 7. *Crepidula perforans* in the aperture of *Tegula funebralis*.

Juvenile *Crepidula* interest me particularly because most adult specimens are completely white and there is no trace of the juvenile shell with its pattern of wavy brown lines. I will need growth series before I can solve identification problems in other calyptraeids which start out white and later develop brown streaks and still others which have brown dots as juveniles.

Although one tends to think of juveniles as having less or at least more subdued sculpture than adults, changes in sculpture are as common as changes in color.

Glans subquadrata (Carpenter, 1864) is a striking example of a species in which the sculpture is highly developed in the juvenile. As the species name suggests, the adult is a rather rectangular shell with the beaks well to the anterior. See Figure 10. However the juvenile is much different. The embryonic shell becomes much thickened and the larval valves open to an 180° angle. The beaks are still central, and around each circular portion of the prodissoconch there is a thick ring that projects to form the top of the shell. Figure 11 shows the prodissoconch on top of the shell with the small flanges that raise up on either side. The sculpture is predominately radial and quite large in proportion to the size of the shell, but there is enough concentric development to produce an odd little group of beads. All the juvenile *Glans subquadrata* of this size that I have seen have been completely white, but later growth shows the brown tones of the adults. This is a very sturdy shell for its size and the embryonic shell is also unusually heavy. Often this is taken as an indication of a long planktonic life, but these little clams brood their young.

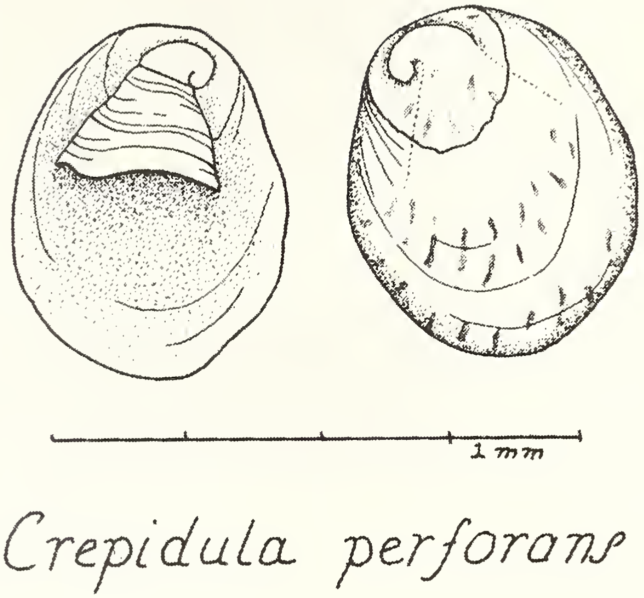

Fig. 8. Drawing of *Crepidula perforans* showing its larval stage.

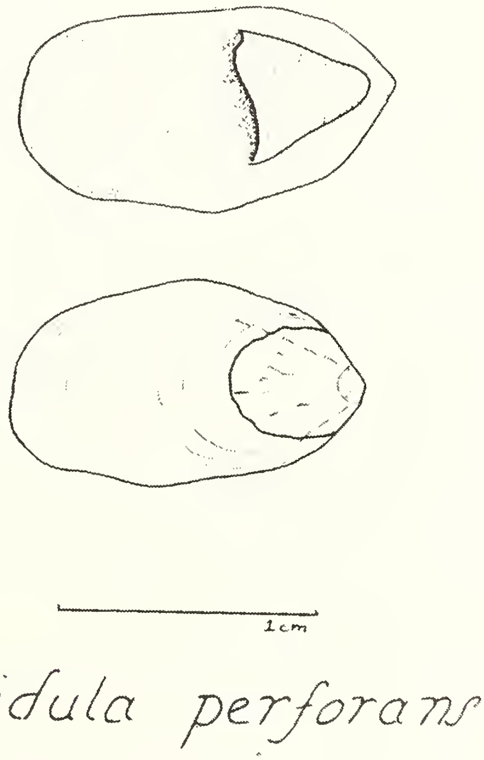

Fig. 9. *Crepidula perforans*, at 1 cm, showing no trace of the larval shell.

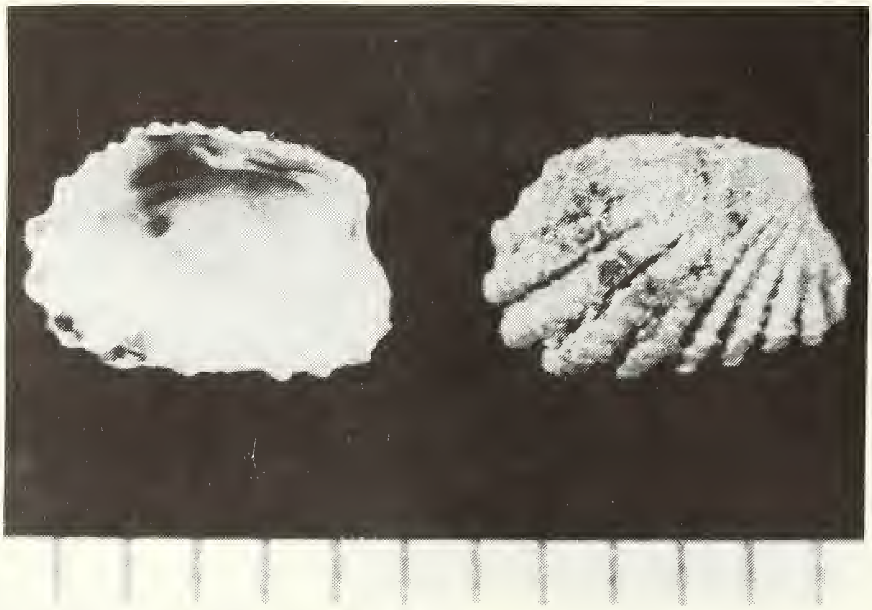

Fig. 10. *Glans subquadrata*, interior and exterior views.

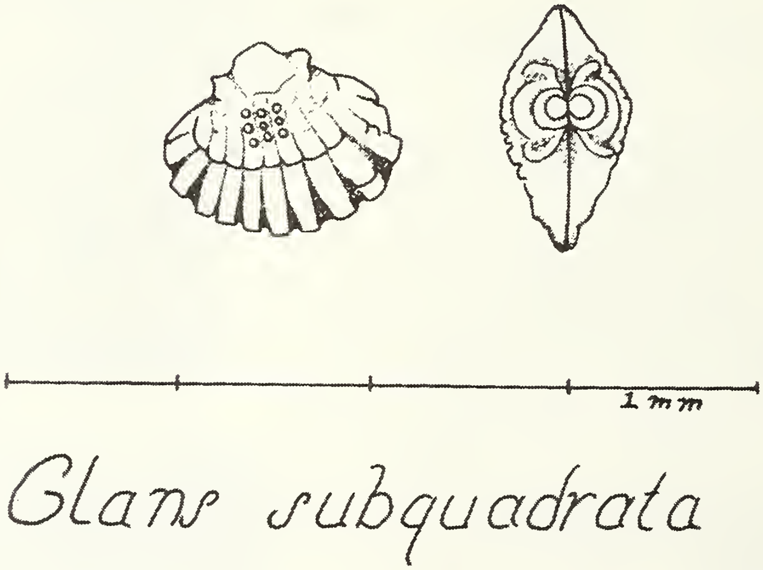

Fig. 11. *Glans subquadrata,* two views: the right view shows the prodissoconch and the left illustrates the sculpture in the early teleoconch stage.

Sometimes not only is there a change in sculpture, but there is so complete a change that the adult shell seems in no way a logical progression of the larval shell. *Philobrya setosa* (Carpenter, 1864) is a small pear-shaped bivalve ranging from Alaska to the Gulf of California. They attach with byssal threads and I've found them on rocks in sandtube worms and seaweed mats along with *Lasaea* and juvenile mussels.

Most prodissoconchs exhibit some variation of spiral growth, but *Philobry setosa* (Figure 12) does not have a typical prodissoconch. The larval

shell is irregular both in surface sculpture and outline and has a thick upraised margin, creating a persistent cap-like effect. This species belongs to the Philobryidae and has several unusual characteristics. The hinge is toothless, there is only one muscle scar, and the periostracum develops its own foliose and spiny pattern, which is particularly marked on the posterior edge of the shell (Figure 13).

Another dramatic change occurs in the juvenile Vermetidae. It's hard to believe that such a notoriously irregular shell (Figure 14) could start life with such a smooth regular protoconch. The protoconch (Figure 15, top) looks quite ordinary except for the aperture which flares out with a sinuous outer margin. Perhaps this enables the

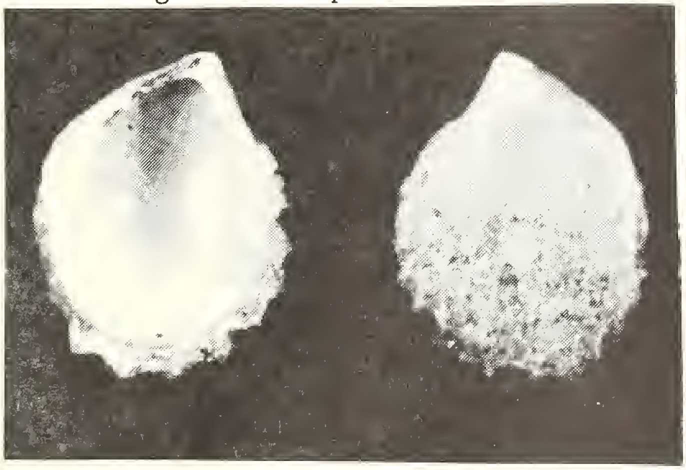

Fig. 13. Interior and exterior views of *Philobrya setosa.*

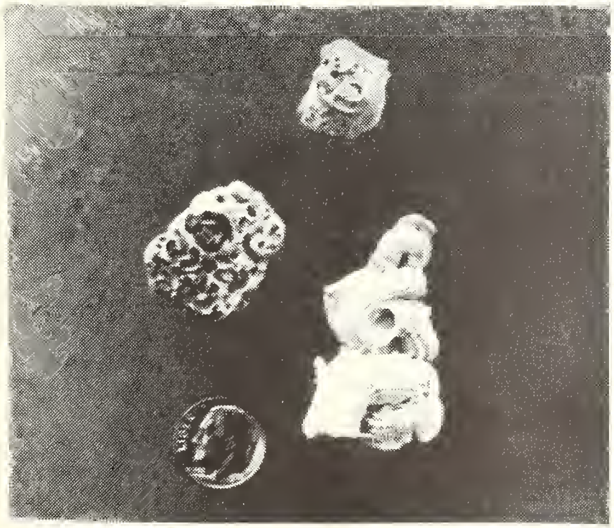

Fig. 14. The irregular vermetid shell.

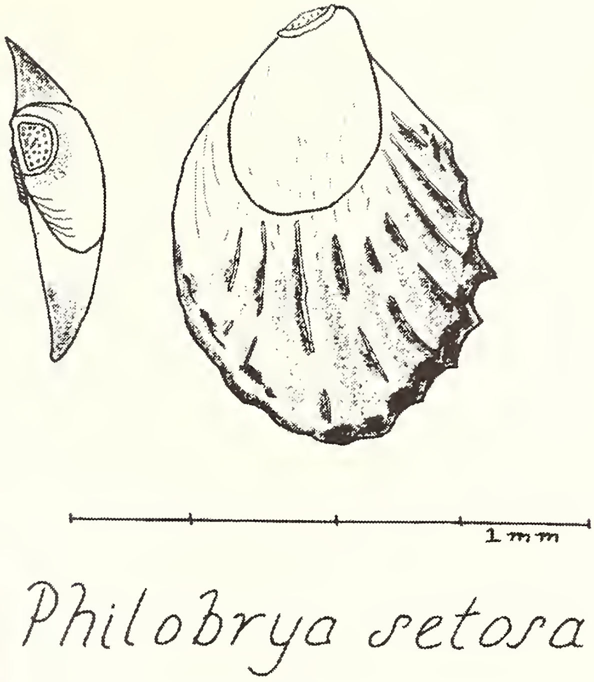

Fig. 12. Drawings showing the larval shell of *Philobrya setosa.*

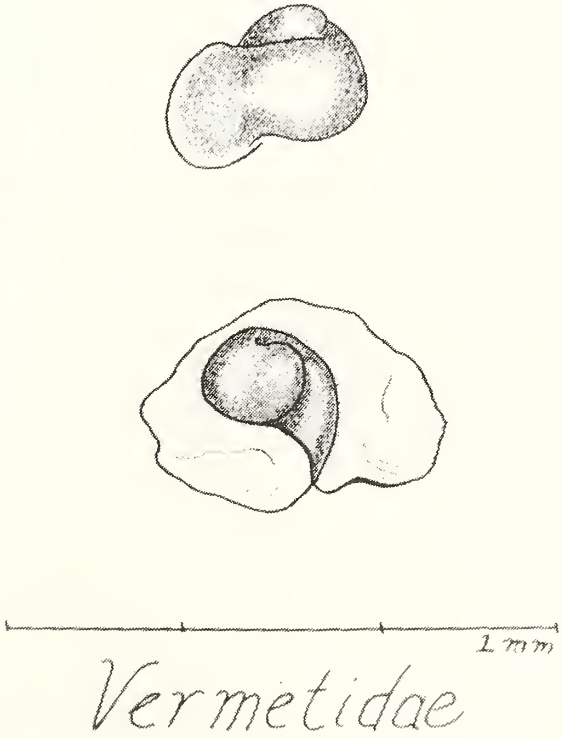

Fig. 15. Drawings of the protoconch and the first whorl of the teleoconch.

animal to attach firmly on a suitable substrate and begin the formation of its adult shell, which will be cemented in place. The next whorl is on an axis of coiling which is 90 degrees to that of the initial whorls (Figure 15 bottom) The junction between protoconch and teleoconch is sharply defined. While the first whorl of the teleoconch neatly encircles the protoconch, and in fact sometimes almost conceals it, later whorls are coiled more and more loosely. I have some vermetid protoconchs that appear quite similar to the one illustrated here, except that they have one more whorl. So far, I have been unable to find a specimen with both adult growth and with the protoconch with an extra whorl. So I have no idea whether it is another species or just normal variation.

Some of the most striking examples of juvenile growth are in the family Cerithiidae. These little brown conical shells have spiral and radial sculpture and a variety of protoconchs, and putting names on them is a big problem. Fully grown animals have certain characteristics on the base and columella that are not well developed on juveniles. The significance of these characters in relation to the value of the protoconch in species determination may prove interesting. I wonder if this will be the family in which we find out just how variable protoconchs can be. In Figure 16, the middle specimen has a sinusigera ridge, a thickened lip on the larval aperture, which makes a very distinct boundary between the protoconch and the teleoconch. This is thought to be a sign of well developed velar lobes in veligers that swim long distances. The three examples shown here are juveniles and would have eventually developed more whorls.

In sorting through algae mats and in washing off clumps of mussels, juvenile mussels are sometimes very abundant, but often difficult to identify. On the upper left of Figure 17 is what I call the basic mussel prodissoconch. I labeled it as a species of *Mytilus* Linnaeus, 1758 (which is always the most

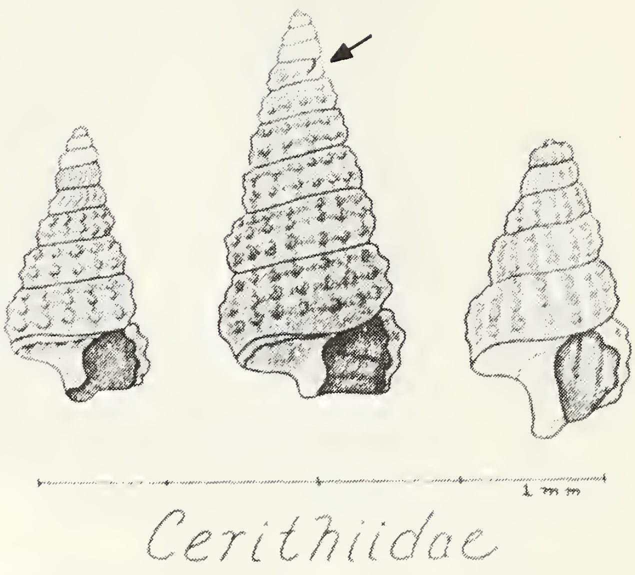

Fig. 16. Juvenile cerithiid specimens showing the larval stage. Note (arrow) sinusigera ridge on middle specimen.

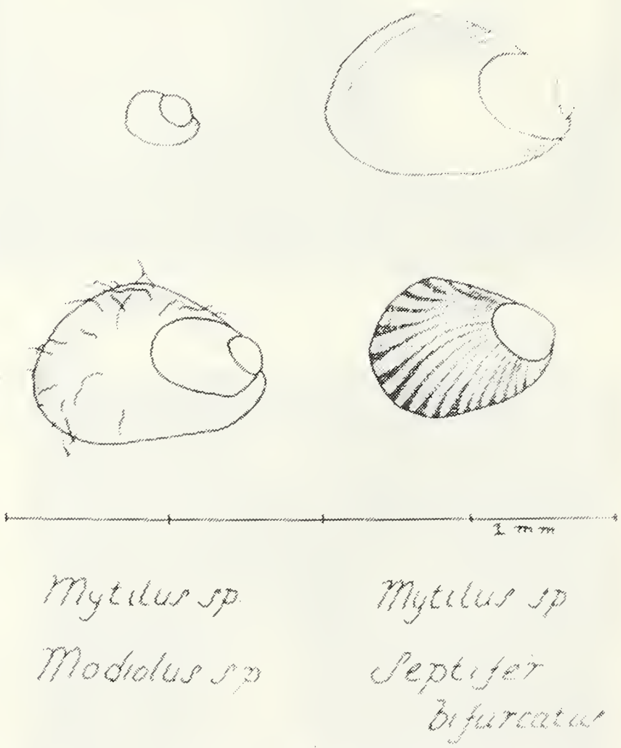

Fig. 17. Drawings of prodissoconchs of mussel species.

likely possibility) but I think that other members of this family start out life in a very similar fashion. The *Modiolus* Lamarck, 1799 prodissoconch just below it is essentially the same. The specimen on the upper right is either *Mytilus edulis* Linnaeus, 1758 or *Mytilus californianus* Conrad, 1837. The sculpture which would distinguish the two does not begin until the animal is much larger, and the sculpture is the best way to tell the difference However, if enough specimens in the right stage of development could be found and examined, I think one would get at least a feel for differentiating the two. It is helpful that *Modiolus* sp. at scarcely over a millimeter already has a few periostracal hairs.

Septifer bifurcatus (Conrad, 1837) in Figure 18 is easily identified because the adult sculpture of axial ribs starts so early. But there is a problem, as those of you know who have collected in southern California. That problem is another mussel called *Brachidontes adamsianus* (Dunker, 1857). As adults, these two are generally about an inch long, occur in the same sorts of places (under boulders, in cracks, and tucked in with other mussel species), and can be quite similar superficially. *Brachidontes adamsianus* tends to be a more southern species while *Septifer bifurcatus* ranges more to the north. In southern California they occur together, and the only sure way to distinguish them is to open the valves. There are other differences, but the most striking is the white shelly deck that forms in the anterior end in *Septifer*. The left view in Figure 19 shows the interior of the valve; the small white area on the anterior side near the beak is the beginning of the shelly septum. *Septifer bifurcatus* develops diagnostic characters very early in its juvenile stage.

In the field, check the prodissoconchs and the shape of the early growth lines. *Brachidontes* is more narrow and arched, while your *Septifer* is wider and flatter. In very young

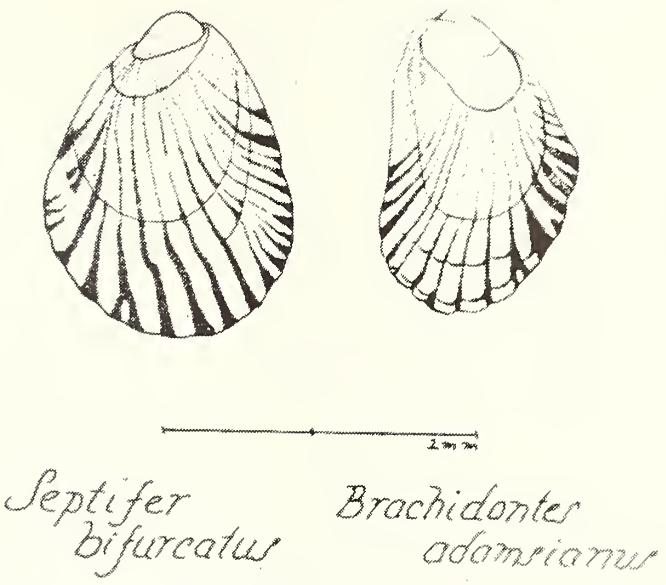

Fig. 18. Juvenile specimens of *Septifer bifurcatus* and *Brachidontes adamsianus*.

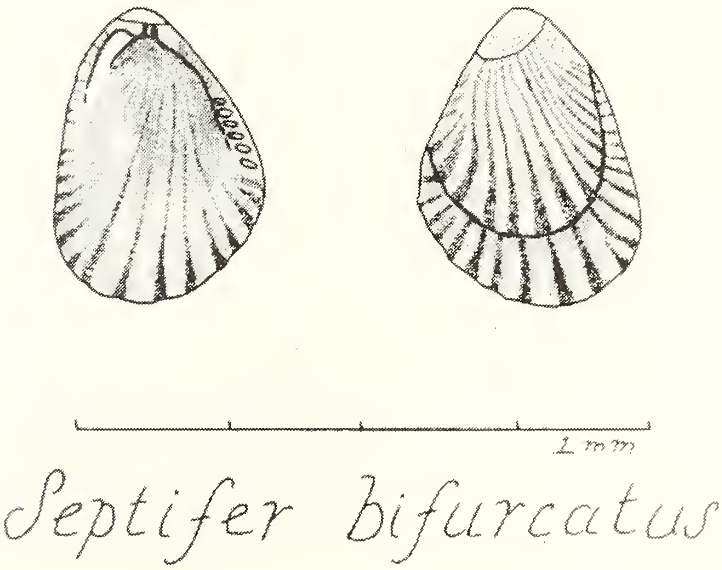

Fig. 19. Two views of *Septifer bifurcatus*, the interior view showing the beginning of the shelly septum.

specimens, there also seems to be a fairly consistent color difference. *Septifer* tends to be a golden brown, while *Brachidontes* shows a wide variety of color patterns in blacks and purples and yellows.

These examples of coloration and sculpture point out not only the changes that occur as the animals mature but also reflect their beauty and complexity.

LITERATURE CONSULTED

ABBOTT, R. TUCKER
1974. AMERICAN SEASHELLS. Van Nostrand Reinhold Co., 633 pp., 24 pls.

BARTSCH, PAUL
1911. The Recent and fossil mollusks of the genus *Cerithiopsis* from the west coast of America. Proc. US Nat. Mus. 40:327-366.

JABLONSKY, DAVID & RICHARD A. LUTZ
1980. Molluscan larval shell morphology, ecological and paleontological applications. In Rhoads & Lutz, 1980 SKELETAL GROWTH OF AQUATIC ORGANISMS. Plenum Press. pp. 323-377.

KEEN, A. MYRA
1961. A proposed reclassification of the gastropod family Vermetidae. Bull. British Mus. (N.H.) Zool.7(3):181-213.
1971. SEA SHELLS OF TROPICAL WEST AMERICA. 2nd ed. Stanford Univ. Press, vii-xiv+1064pp., illus.

________ & EUGENE COAN
1974. MARINE MOLLUSCAN GENERA OF WESTERN NORTH AMERICA, AN ILLUSTRATED KEY. Stanford Univ. Press. 208 pp.

McLEAN, JAMES H.
1978. MARINE SHELLS OF SOUTHERN CALIFORNIA. L.A. County Mus. Sci. ser. 24, revised ed. 104 pp., 54 pls.

Editor's note: Our appreciation to David K. Mulliner for his considerable effort in preparing the black and white prints from Eve Gill's color slides.

FAYE B. HOWARD 1907-1984

From the Santa Barbara Museum of Natural History comes word of the passing of Faye B. Howard, a driving force behind the development of malacology in their Department of Invertebrate Zoology. Beginning in 1932 until shortly before her death, she engaged in private research in conchology. In 1961 she was appointed as a Research Associate in Conchology at the Museum. From 1961 to 1968 she personally funded the position of Assistant in Conchology at the Museum. During the same period Faye organized, financed, and led six major expeditions to West Mexico to study and collect mollusks. With the impetus of Faye's enthusiasm and support, the Santa Barbara Malacological Society was founded in 1962. She served on the editorial board of the Society's publication, the Tabulata, from 1967 to 1974. She authored 22 publications on mollusks and famous malacologists, described two new species of marine gastropods, and had four new species and one new subspecies named in her honor. Her large collection and a bequest which she leaves to the Museum will realize her dream of establishing a major center for the study of mollusks in Santa Barbara.

CLUB NEWS

PUBLICATIONS RECEIVED

The new supplement of Wagner and Abbott's The Standard Catalog of Shells, The 1985 World Size Records, has just been published by American Malacologists, Inc. in Melbourne, Florida. The results are from 21 museums and over 300 private collections. The editors, Wagner and Abbott, believe that many new records lurk in museums where scientists do not have the time or inclination to measure largest specimens. This supplement will be available in the Club library at the March meeting. It will be placed with the other sections of the Catalog already in the library.

Basteria (Journal of Malacology of the Rijksmuseum of Natural History, Leiden, Netherlands) 1983 and 1984 [vols. 47(1-6; 48(1-5)] have been received by the Club library which will continue to receive it in exchange for The Festivus. Issues will be available for circulation at the March meeting.

FROM THE MINUTES - SAN DIEGO SHELL CLUB MEETING - 14 FEBRUARY 1985

Vice President Richard Herrmann was the speaker for the evening. He told of his experiences diving off the San Onofre Nuclear Generating Station as part of his work with the Kelp Invertebrate Project under the auspices of U.S.C., and he brought in a display of mollusks from the area. His slides of the generating station and the surrounding dive sites were of considerable interest as were his comments on the conditions at these sites in relation to those at a control site a distance away from the generating station.

After the refreshment break, provided by Wes Farmer, the Auction/Potluck was discussed at the business portion of the meeting. Members were strongly urged to donate shells for the annual fundraiser to be held on Saturday, 20 April. (See notice, this issue. Ed.).

Jules Hertz announced that the Christmas party will be held on 7 December 1985. Arrangements have been made by John Souder to hold the party at the Mariners' Club once again.

The door prize was won by Barbara Farmer.

THE ANNUAL AUCTION/POTLUCK

The Club's annual Auction/Potluck will be held on Saturday evening, 20 April at the home of Dee and Dick Miller. (A map will be included in the April Festivus). Preparations are being made for this event--the Club's only fundraiser and most eagerly anticipated event of each year.

However the Auction's success, both socially and financially, depends on the generosity of the Club members and friends. Please donate shells--specimens with good collecting data, if possible--to the Auction. If you are unable to bring them to the March meeting, make arrangements with a board member for their pickup. Remember, come to the Auction, and if you have no shells to donate--BUY, BUY, BUY!!

LAST REMINDER THAT DUES ARE DUE

Membership dues for the year 1985 are now overdue. If you have not paid your dues, this will be the last issue of The Festivus which you will receive. To be included on the Club roster which appears in the April issue, dues must be received by 29 March 1985.

THE FESTIVUS
A publication of the San Diego Shell Club

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MEMBERSHIP AND SUBSCRIPTION

Annual dues are payable to San Diego Shell Club. Single member: $7.00; Family membership: $8.00; Overseas (surface mail): $10.00 Address all correspondence to the San Diego Shell Club, Inc., c/o 3883 Mt. Blackburn Ave., San Diego, CA 92111 Single copies of this issue: $5.00. Postage is additional.

Meeting date: third Thursday, 7:30 P.M. Room 104, Casa Del Prado, Balboa Park

COME TO THE AUCTION/POTLUCK!!

(There will be no regular meeting this month)

Date: Saturday 20 April 1985
Time: 6:00 P.M.--?
Place: Home of Dee & Dick Miller

For directions and details, see map on the last page.

CONTENTS

The Festivus welcomes all contributions which further the understanding of mollusks. Both popular and scientific articles are actively solicited. At this time The Festivus does not publish descriptions of new taxa.

Publication date: The publication date of The Festivus appears on the masthead above. The Festivus is published monthly except December.

THE WANDERING WENTLETRAP, EPITONIUM (ASPERISCALA) BILLEEANA (DUSHANE AND BRATCHER, 1965)

BY

HELEN DUSHANE

15012 El Soneto, Whittier, California 90605

Scalina billeeana DuShane & Bratcher, 1965 was moved to the subgenus *Asperiscala* by DuShane (1967) because it has an open umbilicus, a character unknown to any species of *Amaea* or *Scalina*. This mollusk also occurs in shallow water, parasitic on a coral host, while *Scalina* species are dredged on soft, silty, mud bottom. In Dushane (1974) *Scalina* was placed as a subgenus of *Amaea*.

Originally 31 specimens with eggs were taken while diving in from eight to ten feet of water off Cerralvo Island, Baja California Sur, Mexico by Billee Dilworth, for whom the taxon was named. The chrome yellow animal was found to be symbiotic with the soft red-orange coral, *Tubastrea aurea* (Quoy & Gaimard, 1824). At first it was thought to be endemic to the Gulf of California, Mexico. Later records indicate a far wider range. Mme. Jacqueline DeRoy reported specimens from Santa Cruz Island, Galápagos Islands, Ecuador (DuShane collection). Robert Robertson (1970:45) and Robertson and Schutt (1984:1) report *"Epitonium" billeeana* from the Maldive Islands, Singapore, and the Philippines, and with a pink *Dendrophyllia* at the Great Barrier Reef, Australia. DuShane (1979) collected several specimens intertidally (formerly only known from the subtidal) with strings of egg capsules linked by chalaze. These were taken from the red-orange coral *T. aurea* which was attached to enormous boulders on a small sand beach at a -2.5 ft. daylight tide on Isla Bajo Boyarena, Gulf of Panama. Juvenile specimens of *Cassis centiquadrata* (Valenciennes, 1832) with proboscis extended were also on the coral. This might indicate that this coral is host to more than one species of mollusk.

Only a few epitoniid species are known to be ectoparasitic on coral. *Epitonium ulu* Pilsbry, 1921 is associated with the solitary coral *Fungia scutaria* Lamarck, 1801 (Bosch 1965) in the Hawaiian Islands which is the type locality for this species of epitoniid, and also in New Guinea (collected by Twila Bratcher in 1980, diving at 35 feet). *Epitonium costulatum* (Kiener, 1839) occurs with a *Fungia* sp. in the southwestern Philippines (Robertson 1963). Robertson (1970:45) also reports that an "*Epitonium* sp." which is "a species similar to but definitely different from *E. ulu* lives under *Fungia scutaria*..." Further field work may reveal still other species of epitoniids associated with corals.

Literature Cited

BOSCH, H.F.
1965. A gastropod parasite of solitary corals in Hawaii. Pac. Sci. 19:267-268, 1 fig.
DUSHANE, H. & T. BRATCHER
1965. A new *Scalina* from the Gulf of California. Veliger 8(2):160-161, pl. 24.
DUSHANE, H.
1967. *Epitonium (Asperiscala) billeeana* (DuShane & Bratcher, 1965) non *Scalina billeeana* DuShane & Bratcher, 1965. Veliger 10(1):87.
1974. The Panamic-Galapagan Epitoniidae. Veliger 16 Suppl. 84pp., 15 pls. 5 text figs., 1 map.
QUOY, J.R.C. & J.P. GAIMARD
1824 [-1826]. Voyage autour du monde...sur...l'Uraine et la Physicienne

par L. de Freycinet. in Zoologie Vol. 3. vii+712 pp., Paris.
ROBERTSON, R.
1963. Wentletraps (Epitoniidae) feeding on sea anemones and corals. Proc. Malac. Soc. London 35:51-63, pls. 5-7.
1970. Review of the predators and parasites of stony corals with special reference to symbiotic prosobranch gastropods. Pac. Sci. 24(1):43-54.
ROBERTSON, R. & P.L. SCHUTT
1984. Golden wentletraps on golden corals. Hawiian Shell News 32(11):1-12.

BOOK REVIEW

SPIRALS FROM THE SEA
An Anthropological Look at Shells 192 pages
By Jane Fearer Safer and Frances McLaughlin Gill
Crown Publishers, Inc. New York. 1982
$35.00.

This handsome volume, a result of research done for the American Museum of Natural History's Hall of Mollusks and Mankind (completed in December 1975) is not your usual shell book. It deals with the meanings and uses of shells in different societies; linking shells with status or wealth, belief systems and elements of ritual, and as tools in everyday life. In conjunction with the text, the over 60 color photographs of the shell objects and 45 black and white photographs showing how the objects were used, provide an insight into these so-called primitive societies and an appreciation of the crafts of their artisans.

Some of the photographs are outstanding and continue in the reader's mind long after the book has been set aside. In one black and white photo, an Andaman Island woman is shown feeding her baby using the shell of *Nautilus pompilius* as a cup. In a color plate, spoons or ladles of a *Melo* shell glisten like exquisite jewels In another, fishhooks of pearl shell, utilitarian objects, become works of art.

Three pages of notes on source information, photographic sources, and a large bibliography are given for those interested in further reading. An index is also included.

In the words of the director of the American Museum of Natural History, Thomas D. Nicholson, "Mollusks have literally nourished mankind physically as well as spiritually." This book nourishes the reader by giving us a glimpse at ourselves.

Carole M. Hertz

ILLUSTRATION OF THE RADULA OF HOMALOCANTHA DOVPELEDI HOUART, 1982

BY

ANTHONY D'ATTILIO

Department of Marine Invertebrates, San Diego Natural History Museum, Balboa Park, P.O. Box 1390, San Diego, California 92112

Homalocantha dovpeledi Houart, 1982 was described in Informations de la Societe Belge de Malacologie, series 10(1-4):77-80. Its type locality is Eilat, Gulf of Akaba in the Red Sea. A specimen from the type locality was lent to me for examination. It is shown here in Figures 1 and 2. The radula was extracted and mounted and is illustrated for the first time in Figure 3.

Fig. 1. *Homalocantha dovpeledi*, apertural view

Fig. 2. Dorsal view of specimen shown in Figure 1

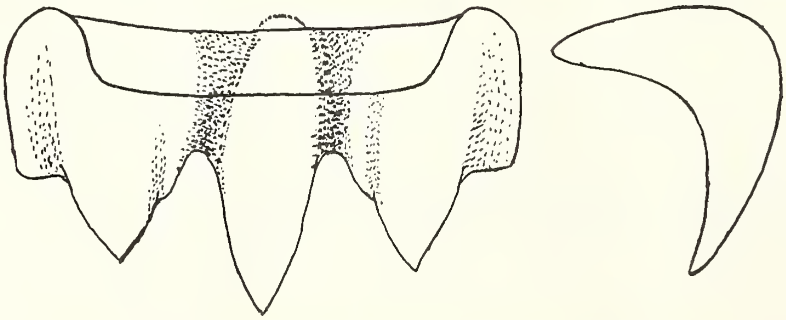

Fig. 3. Radula of *Homalocantha dovpeledi*

It is a radula that is typical for the genus *Homalocantha* Mörch, 1852. The cusps on the rachidian tooth are short and broad. The central cusp is only slightly longer than the lateral cusps and the intermediate cusps are so insignificant as to appear fused with the lateral cusps.

I wish to thank Charles Glass and Robert Foster for the loan of their specimen of *Homalocantha dovpeledi*, Barbara W. Myers for extracting and mounting the radula from that specimen, and David K. Mulliner for the photography.

CLUB NEWS

COME TO THE AUCTION/POTLUCK

The annual auction/potluck will be held at the home of Dee and Dick Miller (See map on last page for details). Festivities begin at 6 P.M.

This is the Club's only fund raising event. Its proceeds provide the funds to publish The Festivus, to support our library, social events, and donations to scientific organizations. We urge ALL, both out of town and local, to donate generously to the auction.

If you have not yet donated, please contact a board member and do so right away so that the committee can prepare the shells and shell list for the auction. Duplicate lists will be available for attendees.

If you are planning to attend, and have not been contacted about your food contribution, please call Dee Miller at 287-4155.

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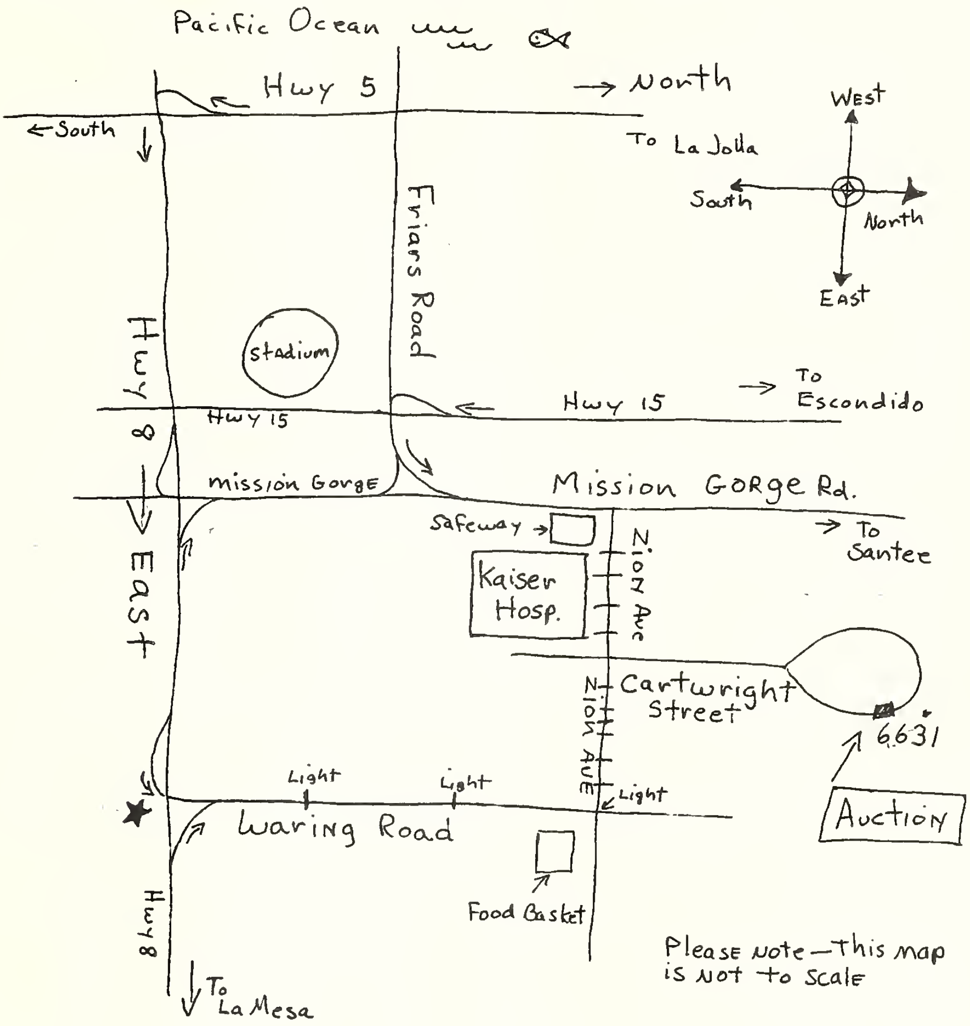
Map to the home of Dee Miller for the
Shell Club auction on April 20, 1985



6631 Cartwright St.
★If you take Hwy 8 the best exit is Waring Road, unless you are familar with the area. Cartwright Street is a cul-de-sac so parking on the block might be a problem but you can park on Zion Ave. If you get lost or have any questions please call Dee Miller at 287-4155.

THE FESTIVUS

A publication of the San Diego Shell Club

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MEMBERSHIP AND SUBSCRIPTION

Annual dues are payable to San Diego Shell Club. Single member: $7.00; Family membership: $8.00; Overseas (surface mail): $10.00

Address all correspondence to the San Diego Shell Club, Inc., c/o 3883 Mt. Blackburn Ave., San Diego, CA 92111

Single copies of this issue: $5.00. Postage is additional.

Meeting date: third Thursday, 7:30 P.M. Room 104, Casa Del Prado, Balboa Park

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PROGRAM

Diving and Shelling in the Philippines
From Manila to Zamboanga

Dave Mulliner and Bob Yin will give this illustrated presentation and shell display from their recent trip.

Lori Jean Hammer of Gompers Senior High School, the Club's 1985 Science Fair winner, will present an outline of her winning project and receive her Club award.

Meeting date: 16 May 1985

CONTENTS

Publication date: The publication date of The Festivus appears on the masthead above. The Festivus is published monthly except December.

A PROBLEM OYSTER IN THE GULF OF CALIFORNIA
("OSTREA" QUERCINUS SOWERBY, 1871 REDISCOVERED)*

BY

JOYCE GEMMELL, CAROLE M. HERTZ, BARBARA W. MYERS

Department of Marine Invertebrates, San Diego Natural History Museum, Balboa Park
P.O. Box 1390, San Diego, California

STUDYING BIOLOGICAL CLASSIFICATION and nomenclature is much like playing a game without beginning or end, in which the rules frequently change, and players of varying ability enter and leave as they please. Whether their actions are from the best or worst of motives, and whether they are ignorant of or choose to disregard the current rules, all players potentially influence subsequent events. Every player must be given the benefit of the doubt, for the most immutable and endurable rule of the game is that it is not competitive but cooperative, in attempting to achieve an orderly arrangement of knowledge with unambiguous, if not stabilized, nomenclature. For some, this goal should also reflect as precisely as possible the phylogenetic history of organisms. Nowhere is the analogy of such a game more thoroughly exemplified than in the nomenclature of oysters.

Harold W. Harry
Veliger 1981

INTRODUCTION

In working on the oysters in the Gemmell collection from San Felipe, northern Gulf of California, we identified *Lopha angelica* (Rochebrune, 1895) and *Saccostrea palmula* (Carpenter, 1857). A third species had defied our attempts at identification. Following Stenzel's (1971) classification of the Ostreacea, we had been unable to place the species taxonomically.

DISCUSSION

The seven Gemmell specimens of the species were found at San Felipe Point, Baja California Norte, Mexico from 1968 to 1976. They were all found live, intertidally at low tide, under large rocks. The specimens were isolated--never found clustered--and found in association with bryozoans, spirorbids and other polychaetes, sponges, and other organisms including mollusks which bore into the shell surface.

The attachment of the left valve was almost complete in all cases. The growth of organisms on the free valve (right valve) served as camouflage. The Gemmell and study specimens (Figures 1-4, 6-7) range in size from 46mm in height by 53.3mm in length to 71mm in height by 60.5mm in length. We are following Stenzel's (1971) measuring system but measuring right valves only. According to Stenzel, the "Length is the largest dimension obtained by projecting the extremities onto the mid-axis of the shell..." See Figure 5 for illustration of the orientation of the right valve of an oyster. The sizes of the Gemmell specimens follow:

71mm H x 60.5mm L	52.6mm H x 52.7mm L
58.8mm H x 62.5mm L	47.6mm H x 54.8mm L
55.3mm H x 56.7mm L	46.0mm H x 53.3mm L
53.1mm H x 55.6mm L	

The specimens are round to suborbicular. The almost completely attached left valve is usually flat. Only the new growth is occasionally somewhat ruffled and turns up (Figures 6 and 7). The free valve is only slightly convex. Exteriorly, the shell varies from dull white to brownish purple and is sometimes

* Identified by H.W. Harry (see Additional Note on p. 46)

Fig. 1. Exterior of study specimen of "*Ostrea*" *quercinus*. SDNHM 27156

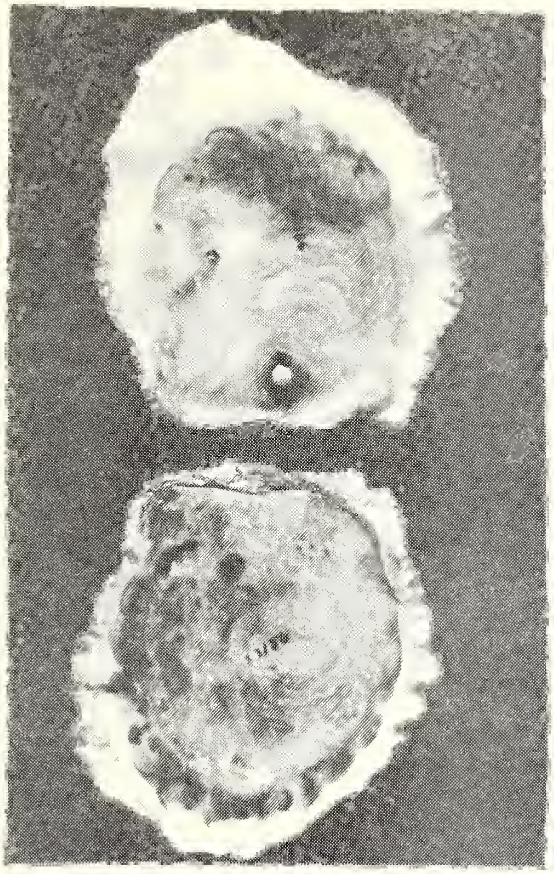

Fig. 2. Interior view of specimen shown in Figure 1.

Fig. 3. Exterior of Gemmell specimen (G-370) of "*Ostrea*" *quercinus*.

Fig. 4. Detail of chomata on interior of specimen shown in Figure 3.

rayed. The surface is covered with growth and eroded in all cases. The interior is dull white, blending to gray or ochre. On some specimens the vesicular structure (honeycomb-like) was evident under magnification, interiorly near the margin. The single adductor muscle scar is large, from broadly oval to circular, and located off-center near the posterior margin. See Figure 7. The hinge line is long in most specimens, almost covering the entire dorsal margin. The umbonal cavity is shallow. Chomata are present on all the Gemmell specimens and other study material examined. (For material studied, see page 46). They are more prominent on the top (right) valve (Figure 4). Chomata, according to Stenzel (1971), are ridgelets or tubercles seen best under magnification. They are located dorsally near the hinge and on either side. They can be found in one or both valves, depending on the generic classification of the oyster. Stenzel states that denticles or teeth serve the purpose of aligning the valves and remain in contact when the valves are open, whereas chomata do not remain in contact when the valves are open and their purpose is obscure.

The Gemmell and study specimens showed characters of two of the families in the Ostreacea as defined by Stenzel, the Ostreidae and the Gryphaeidae. It shows the solitary growth habit and orbicular muscle scar of the Gryphaeidae and the lack of posterior groove and the placement of the muscle scar of the Ostreidae.

Comparison of the Gemmell and study specimens with other species from the Gulf of California, not collected by Gemmell at San Felipe, revealed that *Hyotissa fisheri* (Dall, 1914), a very heavy species which attains a maximum dimension of about 175mm (Keen, 1971), is much larger than the most mature Gemmell specimen (98mm height). The study material also lacked the exterior hyote

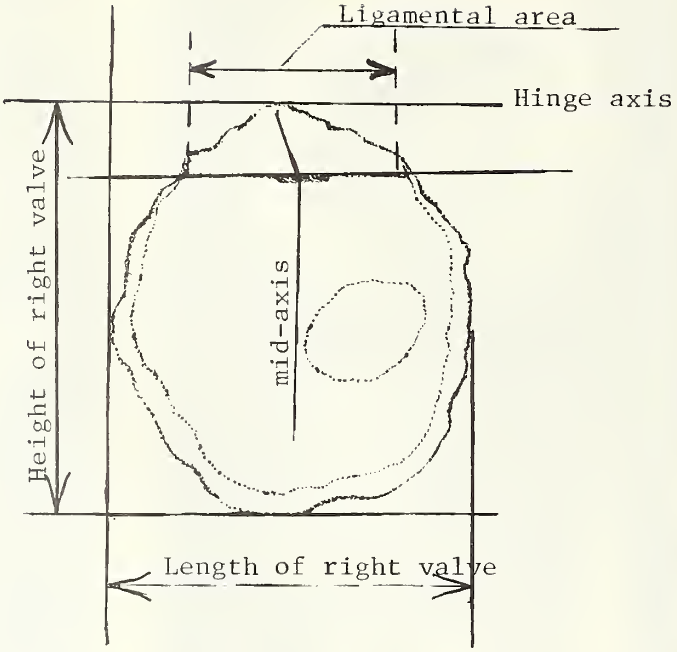

Fig. 5. Illustration of the orientation of the right valve of an oyster.

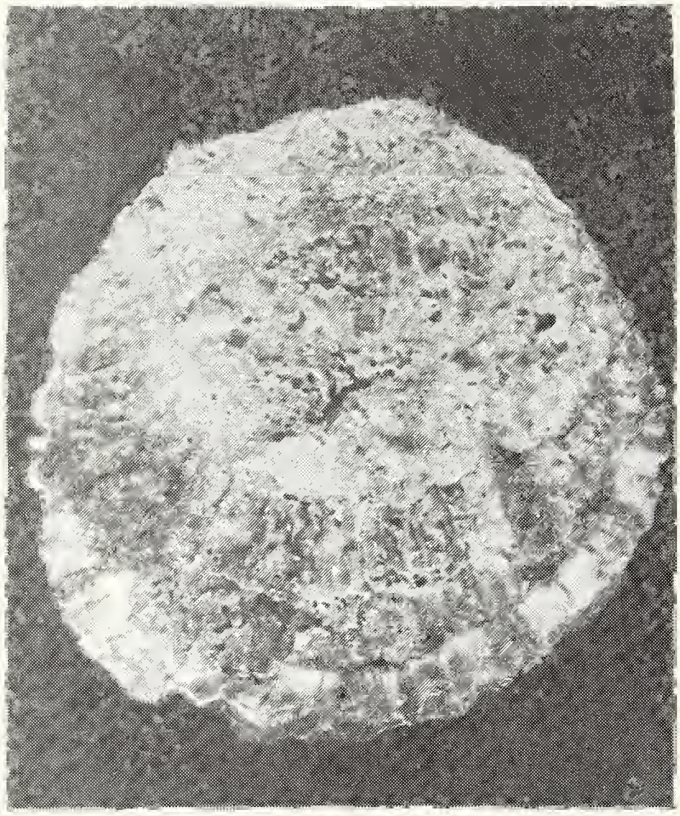

Fig. 6. *"Ostrea" quercinus*, view showing top valve of Hertz specimen.

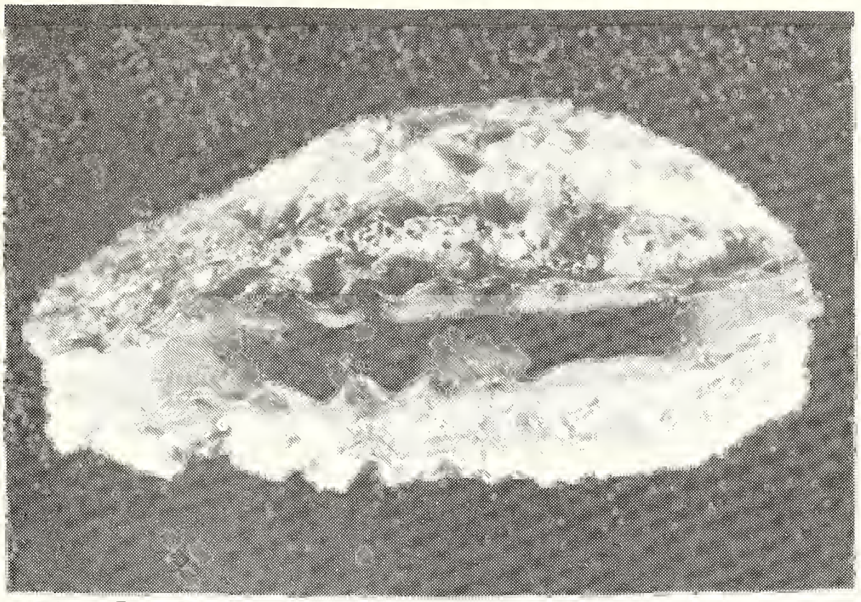

Fig. 7. View of margin of specimen shown in Figure 5 Note the ruffling of the new growth.

spines and the interior wide purple marginal band of *H. fisheri*. The Gemmell specimens have an orbicular to oval muscle scar rather than the kidney-shaped purple muscle scar and purple marginal band of *Saccostrea columbiensis* (Hanley, 1846) They also lack the raised hinge area in the upper valve (with corresponding depression in the attached valve) of *Crassostrea corteziensis* (Hertlein, 1951), and they are not composed of prismatic layers as in *Striostrea iridescens* (Hanley, 1854). The solitary specimens collected by Gemmell contrast with the small species, *Ostrea conchaphila* Carpenter, 1857 which adheres to other oysters as well as to rocks. *Ostrea tubulifera* Dall, 1914 with its tubular spines and *Agerostoma megodon* (Hanley, 1846) an elongate, arcuate species with a sawtoothed ventral margin differ completely from the Gemmell species. The generic classification used above is from Keen & Coan (1975).

The Gemmell and study specimens show a geographic distribution from San Felipe south on the west side of the Gulf of California to Cabo San Lucas and at Puerto Vallarta and Manzanillo on the mainland of Mexico.

MATERIAL STUDIED

SDNHM 50263, 9 specimens from Manzanillo, Colima Mexico, collected in March 1930

SDNHM 27157, 2 specimens from Cabo San Lucas, Baja California Sur, collected March 1929 by H.N. Lowe

SDNHM 52758, 1 specimen from Bahía San Luis Gonzaga, Baja California Norte, Mexico collected by Fay Wolfson

SDNHM 58834, 2 specimens from Bahía Concepción, Gulf of California

SDNHM 61389, 1 specimen from Puerto Vallarta, Jalisco, Mexico in 1965, "intertidal at very low tide" collected by E.C. Wilson & A. Carney

SDNHM 50262, 1 specimen, Carmen Island, Gulf of California in 1932

SDHNM 15968, 2 specimens from Manzanillo, Colima, Mexico in 1930 collected by H.N. Lowe

SDNHM 27151, 1 left valve, Bahía Concepción, Gulf of California, 1932, collected by H.N. Lowe.

Hertz collection, 1 specimen from San Felipe, Baja California Norte, Mexico, at "Rudy's #2" on bottom side of rock at -4.01' low tide, collected by C.M. Hertz on 25 February 1971.

ADDITIONAL NOTE

We sent our manuscript for review to Dr. Harold W. Harry, who has a major revision of the Ostreacea in press. He identified our problem species as "*Ostrea*" *quercinus* Sowerby, 1871 in Reeve. Dr. Harry, in a study that paralleled ours, had specimens of the same "problem oyster," and his identification was made after

examining the type in the British Museum (N.H.) (pers. comm.).

Following is the original description of *Ostraea* (sic) *quercinus* from Sowerby, 1871 in Reeve. A copy of the original illustration is shown here in Figure 8.

Species 43. (Fig. *a*, *b*, Mus. Hanley.)

OSTRÆA QUERCINUS. *Ost. testâ suborbiculari, irregulariter rugatâ, ad marginem plicatâ, compressâ, obscurè purpureâ; valvâ inferiori subcomplanatâ, superiori convexiusculâ; intùs quercinus, margine albido, strigato, fimbriato; impressione musculari maximo, concentricè strigato.*

THE OAK OYSTER. Shell suborbicular, irregularly rugged, plaited at the margin, compressed, dull purple; lower valve rather flattened, upper rather convex; within oak-coloured, margin whitish, striped, fimbriated; muscular impression very large, concentrically striped.

SOWERBY.

Hab. —— ?

A remarkable shell in Mr. Hanley's collection, which I can assign to no known species. The oak-wood colouring of the interior and the large size of the muscular impression, are the distinguishing characteristics.

43 *a*

43 *b*

Fig. 8. *Ostraea* (sic) *quercinus* copied from Sowerby, 1871 in Reeve

ACKNOWLEDGMENTS

We wish to express our appreciation to Harold W. Harry for identifying our specimens and for his kind words of encouragement in our struggle with the oysters. Our appreciation is also extended to Eugene Coan who read the manuscript and advised us on the paper. We thank David K. Mulliner for photographing the specimens and Peggy Smith, Scientific Librarian at the San Diego Natural History Museum, for locating references not in the Museum library.

LITERATURE CITED

CARPENTER, P.P.

1857. Catalogue of the collection of Mazatlan shells in the British Museum. Reprint. Paleo. Res. Inst. 1967. 552 pp.

DALL, W.H.

1914. Notes on west American oysters. Nautilus 28(1):1-3.

HANLEY, S.D.T.

1846. A description of new species of Ostreae in the collection of H. Cuming Esq. PZS London for 1845, pp. 105-107.

1854. Conchologica Miscellany. *Ostrea*. pl. 2, figs. 6,7.

HARRY, H.W.
1981. Nominal species of living oysters proposed during the last fifty years. Veliger 24(1):39-45.
HERTLEIN, L.G.
1951. Descriptions of two new species of marine pelecypods from West Mexico. Bull. S. Calif. Acad. Sci. 50(2):68-75, pls. 24-26.
KEEN, A. M.
1971. Sea shells of tropical west America. 2nd ed. 1064+ pp. illus. Stanford Univ. Press.
__________ & E. COAN
1975. Sea shells of tropical west America, additions and corrections to 1975. W.S.M. Occas. Pap. 1, 66 pp.
ROCHEBRUNE, A.T. de
1895. Diagnoses de mollusques nouveaux, provenant du voyage de M. Diguet en Basse-Californie. Bull. Nat. Mus. d'histoire Natur. Paris. vol. 1(6):239-243.
SOWERBY, G.B. Jr.
1871. (in Reeve) Conchologia Iconica. *Ostraea* vol. 18, pl. 19, sp. 43.
STENZEL, H.B.
1971. Oysters. (in Raymond C. Moore, ed.) "Treatise on Invertebrate Paleontology" Pt.N (Mollusca 6: Bivalvia, vol. 3) pp. 953-1224, 153 figs.

BOOK REVIEW

Facsimile edition of:
THESAURUS CONCHYLIORUM OR MONOGRAPHS OF GENERA OF SHELLS
Monographs of the Genus *Murex* (softbound)
By G.B. Sowerby, Jun., F.L.S., 1879
Facsimile edition published by Luis Pisani Burnay, Lisbon, 1983
24 colored plates, 264 figures (unbound in slipcase)
Price: $18.95

This is a facsimile reproduction of the 1879 monographic iconography of the genus *Murex* in the Thesaurus Conchyliorum by George Brettingham Sowerby, Jr. This reproduction is of the highest quality and permits us to see Sowerby's concept of each species illustrated and described, without having to search for the rare original work.

Sowerby Jr. had great skill in depicting molluscan shells of all kinds and in his treatment of the genus *Murex* he prepared 24 colored plates with 264 figures. (The plates in this facsimile edition are unbound in a slipcase and the text is softbound). Sowerby's genus *Murex* is actually the family Muricidae as we understand it today. He omitted some genera and the species groups of these genera which he did not believe were properly *Murex*. Sowerby never proposed new genera in this work.

Besides the Thesaurus Conchyliorum, which kept several of the Sowerbys busy, G.B. Sowerby Jr. did all of the several thousand colored drawings for Reeve's Conchologia Iconica and much of the work on the Conchological Illustrations. As practiced in that time, black and white lithographs were prepared from his fine paintings and were colored by others (copying the original paintings) after the printed pages were ready.

One of the benefits of technology, not ordinarily remembered or noticed in

this century, is the ability to make available to the general, interested public, facsimile copies of very rare or out of print books. Advanced photolithography or photoengraving techniques makes possible the reproduction of old, hand illustrated books or manuscripts which are hardly distinguishable from the originals. The use of these techniques to make available again exact copies of literature dating before this century, for often very modest cost, cannot be overestimated. For those of us interested in having easily available copies or owning these rare works in natural history subjects, be they on mollusks or otherwise, this fact is a benefit truly.

Because a large amount of work by skilled artisans is necessary to produce even several hundred copies of an illustrated treatise in natural history, the books were often out of print in a few years since they were often printed only in sufficient numbers for subscribers. The plates, with or without text, were issued in parts and subscribers could then have them bound in any manner, including expensive leather binding which itself was decorated and embellished with gold leaf and color. For many of these works the subscribers were the educated, wealthy public or institutions of learning, libraries etc. There was then no substantial number of moneyed, middle class buyers with either the education or the interest, brought on by education, for many of these books. This was especially so for the folio and larger than folio size works such as Birds of America by Audubon. Many treatises, begun pretentiously, cut off early or before completion because they lacked wealthy subscribers.

As a side comment on the subject of expensive books, I may add that even in this century such handmade books are being published in which both special handmade paper and original etchings or lithographs are used to illustrate works. These are most often works of literature or poetry in which the aesthetic interest is primary. Even now the general public is hardly aware of the publication or availability of these works. Modern works on natural history largely make use of straight photography but the continued and growing interest in natural history has focused the attention of publishers on the subject of making exact or facsimile reprints of those books which will have widespread interest, especially since technology makes it possible to reproduce these works at a reasonable, low cost for an ever enlarging public. Of greatest value are those books containing text and figures having primary taxonomic interest.

The cost of printing such books is a major difficulty for many industrialized countries in which labor costs are very high. The result has been (and is) for the printing to be undertaken in countries with cheaper labor such as Taiwan, Korea, Portugal and Italy. Even so, the reprinting of the larger folio size works remains expensive today and these are still published in small numbers.

The *Murex* volume reviewed here was printed in Portugal and is one of a number of monographs from the "Thesaurus" already published. For its accuracy of reproduction and the excellent nature of the illustrations, this undertaking, if carried out for the entire "Thesaurus," will be a most important contribution for making this rare work of Sowerby available to all interested in malacology.

Anthony D'Attilio

THE MYSTERY OF THE DREDGE

BY

TWILA BRATCHER

8121 Mulholland Terrace, Los Angeles, California 90046

Dredging can be one of the most exciting parts of a shell collecting trip. It's a treasure hunt. My heart beats faster as the moment of truth approaches when the top of the dredge, with its still unseen treasures, breaks the surface of the water beside the boat. Dredging was particularly welcome on our recent trip to Coiba Island, Panama because Bob Griffin, owner of Club Pacifico where we were staying, was most discouraging about our scuba diving. We were limited to 44 pounds of luggage on the small plane transporting us to the Club. That eliminated taking our hookah. Finally he agreed to send over four scuba tanks belonging to the Club. When we arrived, we discovered there were no backpacks.

At the Club they kept talking about the aggressive behavior of the 18 or 19 foot tiger sharks, which they feed each day after cleaning the fish brought in by the fishermen. Club Pacifico is a fishing camp. We (Bob and Jay Stuart; Rosemary Adams; Edith Wilkerson; my sister, Billee Dilworth; and I) were their first shelling group. We were warmly welcomed and furnished with boats and a boatman to transport us to shelling sites. But we were discouraged from jury-rigging some sort of backpack for diving. The propoganda about the sharks continued even though we said we had dived with sharks many times but had never encountered an aggressive one. (The large population of sharks is one reason Coiba Island was chosen as Panama's penal colony. The prison camp is about 45 minutes by boat from Club Pacifico with dense jungle between).

When we first arrived we were kept busy working two minus tides a day. After the tides had eased off a little we worked a daytime tide in an area covered by a couple of feet of water and then went to another island for snorkling. Thinking we would be back early, we had failed to bring lunch and we were all anxious to return to the Club. However, we could not resist making at least one dredge haul as we approached camp.

Bob Stuart's dredge measured 24x12x6 inches with heavy links of chain between the dredge and the line. In went the dredge. Bob had his fingers on the line and could feel it biting into the sand. It was in only about 15 feet of water. Suddenly Bob shouted, "We've lost the dredge!"

He had felt a sudden jerk and then nothing. Bob dived in the water and found the path the dredge had made but no dredge. We were close to our home base so we decided to wait until morning to search for it. Bob Griffin said," One of those big tiger sharks swallowed it."

The next morning Bob, Jay, Billee, and I went out, lined up our points of reference, and found the path where the dredge had cut through the small algae on the bottom. The path ended suddenly. We four swam a grid pattern for about a hundred yards surrounding the end of the dredge trail. The bottom was smooth; no coral heads, no rocks, no obstructions of any kind--also no dredge.

Bob Griffin still insisted a big shark had taken it. He told us tales of sharks repeatedly attacking the blades of the motor of a boat until both shark and blades were covered with blood. The dredge was lost at about the hour the sharks are usually fed.

The next day our group went snorkling in the second cove from the camp and Billee and I each found a pair of *Cypraea alisoni* Burgess, 1983 which are rare in the eastern Pacific. We decided to swim back to camp (quite a long swim) instead of having the boatman take us and when we started our swim

Billee said to me, "Don't get out in the middle of the bay. Let's stay close to the rocks along the side." The propaganda was having its effect.

We were happy with the results of our minus tide collecting and our snorkle diving, but we were sorry to miss that exciting part of our trip, the dredging. The mystery of the missing dredge was never solved.

CLUB NEWS

FOR YOUR INFORMATION

The Western Society of Malacologists will hold its 18th Annual Meeting at the University of Santa Barbara, in Santa Barbara, California on August 18-21, 1985. A full schedule of Contributed Papers is planned in addition to symposia, molluscan natural history notes, exhibits, workshops, field trips, and shell and book auction.

For further information, contact Conference Chairman, William D. Pitt, 2444 38th Ave., Sacramento, CA 95822 or Treasurer, Margaret Mulliner, 5283 Vickie Dr., San Diego, CA 92109.

Two student research grants of $750. each are announced by the Western Society of Malacologists. WSM will award a grant of $750. to an undergraduate or graduate student for the academic year 1985-86. It is offered to initiate or further research concerned with mollusks, in systematics, biology, ecology or paleontology or related fields. An additional grant of $750. is offered by the Southwestern Malacological Society, the recipient of which will be selected from the applications submitted to the WSM. For an application form and/or additional information on requirements contact Dr. Vida C. Kenk, WSM Committee on Student Grants, Dept. Biological Sciences, San Jose State University, San Jose, California 95192.

THE ANNUAL AUCTION/POTLUCK

This year's annual fund raising party was held on Saturday evening, April 20th at the home of Dee and Dick Miller. It was a marvelous party! Not only was it a financial success but the over fifty members and guests who attended enjoyed a bounteous feast of homemade specialties along with Dave Mulliner's magic punch and the companionship of old and new friends.

Shells and art work to be auctioned filled the Miller's billiard table and the bidding under auctioneers Carole Hertz and Marty Schuler began promptly at eight. Much laughter and lively competition for the choice shells lasted late into the evening.

It was great fun and the Club is indebted to those who gave their time to prepare for the auction, our friends and members who donated generously of their shells and art work, and most of all to our gracious hostesses Dee and Michelle Miller who opened their beautiful home to us and made us all welcome and comfortable.

CORRECTION

The membership roster, published in the May 1985 issues should read "Membership Roster 1985" not 1984.

FROM THE MINUTES - SAN DIEGO SHELL CLUB MEETING - 21 March 1985

Tim Herrlinger, marine biologist at USC, discussed the predator/prey experiments he conducted at the Hopkins Marine Life Refuge in Monterey Bay. The insatiable seastar, *Pycnopodia helianthodes* (Brandt, 1835), which attains a diameter of over two feet, and *Pisaster giganteus* (Stimpson, 1857) were the predators in a seemingly uneven contest with three species of *Tegula* [*T. brunnea* (Philippi, 1848), *T. montereyi* (Kiener, 1850), and *T. pulligo* (Gmelin, 1791)] and three species of *Calliostoma* [*C. canaliculatum* (Lightfoot, 1786), *C. annulatum* (Lightfoot, 1786) and *C. ligatum* (Gould, 1849)]. He found that each of the gastropods employed a different defense mechanism with varying results. Slides and graphs were used to illustrate his results and conclusions.

The winner of the Club Science Fair Award was 17 year old Lori Jean Hammer an eleventh grader at Samuel Gompers Senior High School. Her winning project on the regeneration of brittle stars was entitled, " Retinol and Ophiuroidea Autonomy." She will receive a book award from the Club and attend a meeting to present an outline of her winning project.

Barbara Myers

ADDITIONS TO THE ROSTER

Perrin, Marilyn, 10960 Via Abaca, San Diego, CA 92126, 586-0175
Soto, Jeff, 8950 Villa La Jolla Dr., S-6-1200, La Jolla, CA 92037
Valli, Adrian, 1549 North Vulcan #26, Leucadia, CA 92024

CHANGE OF ADDRESS

Covey, Jewell, 5666 E. Hampton, Apt. 252, Tucson, AZ 85712

<u>The Festivus</u> welcomes all contributions which further the understanding of mollusks. Both popular and scientific articles are actively solicited. At this time <u>The Festivus</u> does not publish descriptions of new taxa.

THE FESTIVUS
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MEMBERSHIP AND SUBSCRIPTION
Annual dues are payable to San Diego Shell Club. Single member: $7.00; Family membership: $8.00; Overseas (surface mail): $10.00
Address all correspondence to the San Diego Shell Club, Inc., c/o 3883 Mt. Blackburn Ave., San Diego, CA 92111
Single copies of this issue: $5.00. Postage is additional.
Meeting date: third Thursday, 7:30 P.M. Room 104, Casa Del Prado, Balboa Park

PROGRAM

Paul Scott, of the Santa Barbara Museum of Natural History, will give a talk entitled, "Hunting Mollusks in the Beaufort Sea." He will show slides taken in that cold, inhospitable part of the world.

Meeting date: June 20, 1985

CONTENTS

Publication date: The publication date of The Festivus appears on the masthead above. The Festivus is published monthly except December.

The Festivus welcomes all contributions which further the understanding of mollusks. Both popular and scientific articles are actively solicited. At this time The Festivus does not publish descriptions of new taxa.

CYPRAEA ANNETTAE DALL, 1909 VS C. AEQUINOCTIALIS SCHILDER, 1933; A STATISTICAL, OPTICAL, AND SEM COMPARISON

BY

HUGH BRADNER

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La Jolla, California 92093

Abstract: Comparisons of shell dimensions, tooth count, and radula details indicate that *Cypraea annettae* Dall, 1909 may appropriately be called a different species than *C. aequinoctialis* Schilder, 1933.

Cypraea annettae Dall, 1909 is an easily recognized species of cowrie common in the Gulf of California. It is reported along the Pacific side of Baja California and along the western side of Mexico as far south as Pulmo Reef (Keen 1971, Burgess 1970). I have collected them as far south as Rincon Guayabitos, Nayarit, near Puerto Vallarta. *C. aequinoctialis* occurs in the Bay of Panama, along the Panama coast, and along South America to Peru (Burgess 1970). It is a rare cowrie; most specimens have apparently been collected at Venado Island, Panama. Table I shows collecting areas for specimens of the present study. Only one specimen of *C. aequinoctialis* could be obtained from museums; the rest came from private collections.

Geographical separation and a fairly consistent difference in appearance of the shells has caused some authors to list *C. annettae* and *C. aequinoctialis* as different species. Burgess (1970) lists *C. aequinoctialis* as a valid species, but remarks that it may be only a geographic variation of *C. annettae*. Others list the two as subspecies of *Cypraea (Zonaria) annettae* Dall, 1909 (Keen 1971, Wagner & Abbott 1978). Figures 1 and 2 show dorsal and apertural view of both cowries, *C. annettae* (top row) from the Gulf of California and *C. aequinoctialis* (bottom row) from Panama.

Fig. 1. Dorsal views of *C. annettae* (top) and *C. aequinoctialis* (bottom)

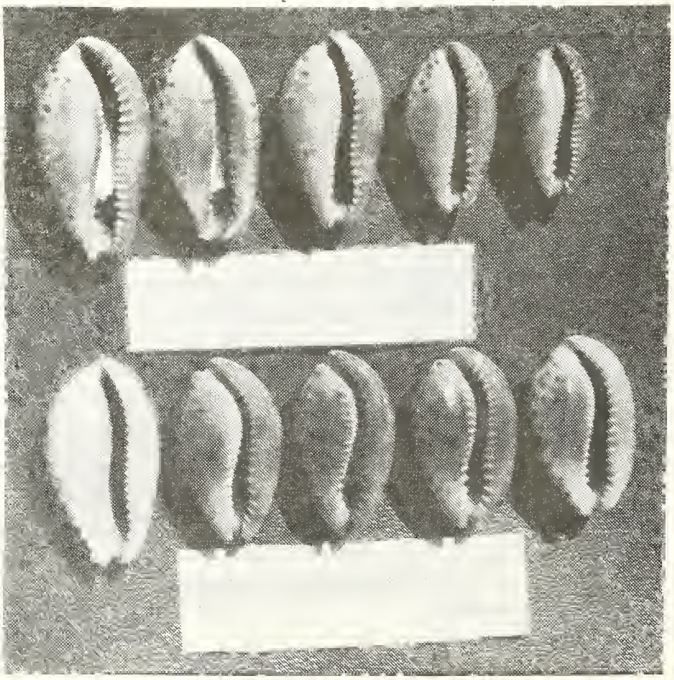

Fig. 2. Apertural views of same specimens shown in Figure 1

Cypraea aequinoctialis differs from *C. annettae* by having coarser teeth, heavier, more ovate shell, more curved aperture, and less produced extremities, and is more produced on the columellar side. The present paper reports measurements of length/width (L/W) ratio and columellar tooth count on 21 *Cypraea aequinoctialis* and 53 *C. annettae* shells, as well as labial tooth count on a smaller sample. Radulae of 8 *C. aequinoctialis* and 6 *C. annettae* were also compared visually, and two specimens of each species were compared by scanning electron microscope. A small difference has previously been reported in SEM study of a single radula of each species (Bradner 1982). L/W ratios for the 74 specimens is shown in Figure 3. The two groups are clearly separate, but there is some overlap. The specimen of unverified origin has a L/W ratio of 1.8. Reduced columellar tooth counts, calculated by the procedure of Cernohorsky (1971) following Schilder (1930), are shown in Figure 4. Reduced counts were calculated by assuming that the quantity (number of teeth less 7) varies as the square root of the shell length. Following Cernohorsky, the tooth counts have been normalized to a 25 mm shell. Normalizing to a 40 mm shell would decrease the size of the tooth count correction, but does not qualitatively change the shapes of the distributions shown in Figure 4. The reduced count for the shell of unverified origin is 15, thus campatible with either species. Table II shows mean and standard variations for L/W ratios and tooth counts.

TABLE I

CYPRAEA COLLECTING AREAS

Cypraea annettae	No. of specimens
Bahía Concepción	15
Bahía Gonzaga	5
Bahía de Los Angeles	14
Guaymas	2
Pta. Arenas	1
Pta. Pescadero	5
Puertecitos	3
Rancho Eveka	1
Rincon Guayabitos	3
Sta. Rosalia	4
Total	53

Cypraea aequinoctialis	No. of specimens
Isla Lobos de Afuera, Peru	1
Playas de Villamec, Guayas, Ecuador	3
Isla Venado, Panama	16
" (unverified)	1
Total	21

TABLE II

MEANS AND STANDARD DEVIATIONS FOR L/W RATIO, COLUMELLAR AND LABIAL TOOTH COUNTS

	C. annettae			*C. aequinoctialis*		
	No.	$\bar{x}$	s	No.	$\bar{x}$	s
L/W	53	1.81	0.077	21	1.63	0.062
Columellar	53	14.40	1.098	21	12.43	1.248
Labial	28	19.82	1.867	10	18.30	0.949

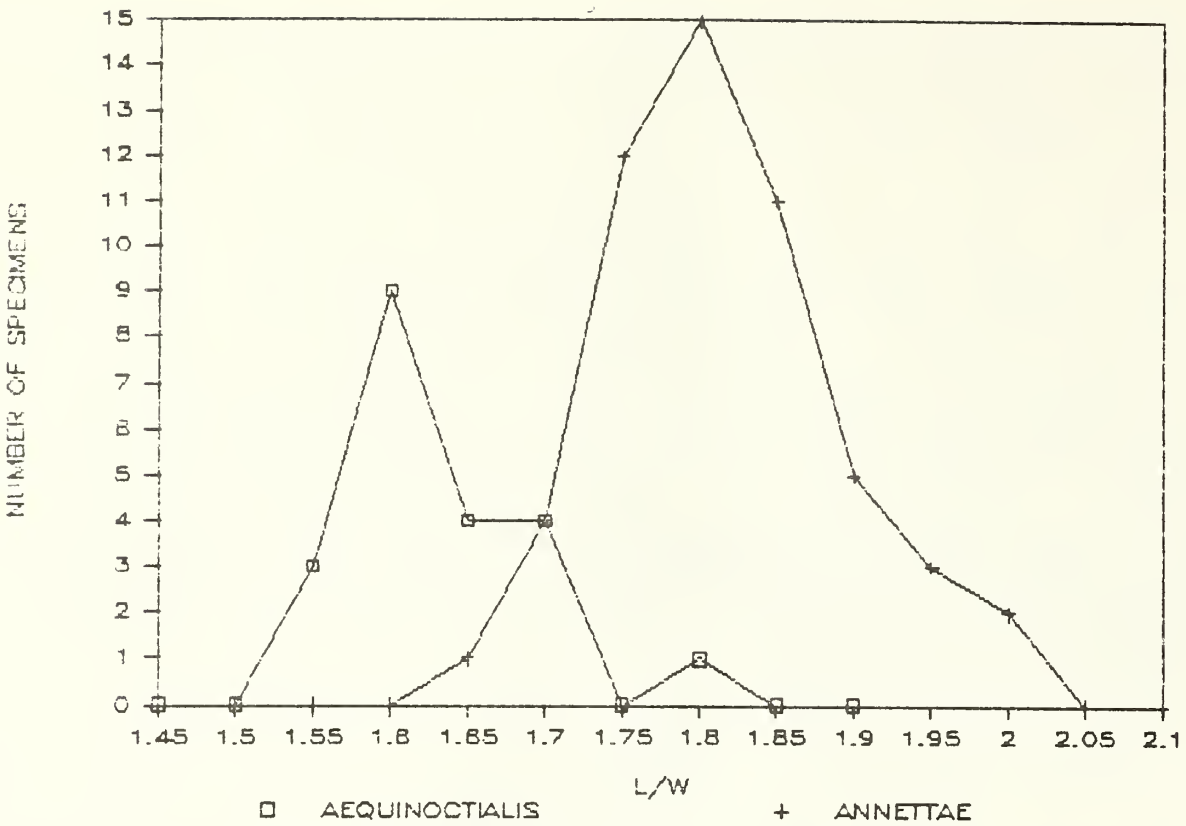

Fig. 3 Ratio of length to width for *C. aequinoctialis* and *C. annettae*

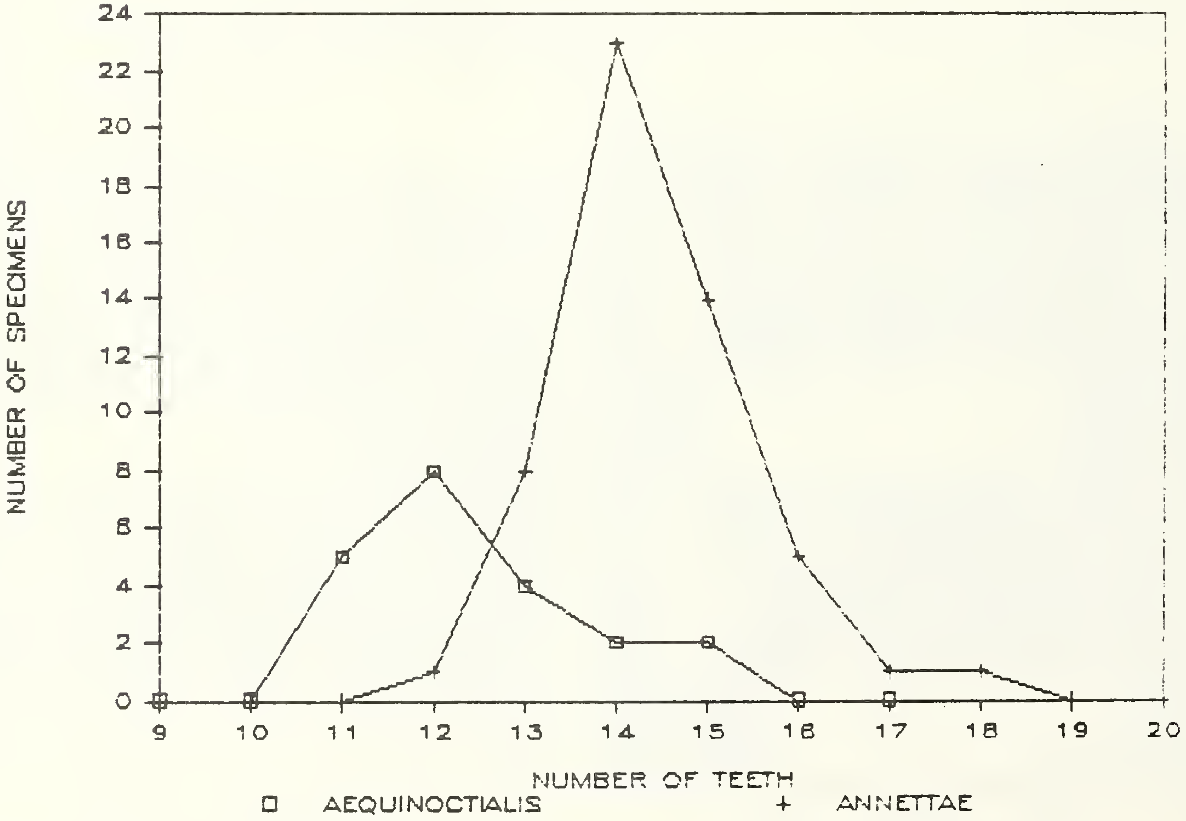

Fig. 4 Reduced columellar tooth count for *C. aequinoctialis* and *C. annettae*

If we assume that the dimensions and tooth counts are randomly distributed about some mean values, then statistical analysis can be employed to calculate confidence limits regarding the existence of two separate species distributions. That is, we can determine the probability, on a purely statistical basis, that very large samples might show the same L/W ratio (or tooth count) distributions for both species. For small samples, the Student's t-distribution gives more accurate deviation. It shows less than 10^{-6} statistical likelihood that the two species have the same mean L/W ratio or the same reduced columellar tooth count.

Aperture curvature and produced extremities are difficult to judge objectively, but the two species appear to differ slightly, as noted above. *C. aequinoctialis* is usually lighter red brown ventrally than *C. annettae*, but the difference is not great enough to be a reliable way of distinguishing the species.

Although radula tooth shapes are indistinguishable in scanning electron micrographs, the placement of teeth on the radular ribbon is different (Bradner 1982). SEM photos of two specimens of each species show that rows of *Cypraea annettae* teeth are more curved than rows of *C. aequinoctialis* teeth. See Figures 5 and 6 for SEM photos of *C. annettae* and *C. aequinoctialis* radulae.

Fig. 5. SEM photo of radula of *C. annettae*

Fig. 6. SEM photo of radula of *C. aequinoctialis*

Visual observations of six *C. annettae* and eight *C. aequinoctialis* radulae indicate that this difference is consistent: the mounted radulae of the 14 specimens were shuffled, randomly selected, and placed one at a time under a stereo microscope for inspection by another observer who was asked to say whether the rows were strongly or weakly curved. The same procedure was repeated with a different shuffler and observer. The observers' judgements confirmed that the curvature is species specific.

Taken together, the characteristics described in this paper seem sufficient in almost all cases to distinguish between *Cypraea aequinoctialis* and *C. annettae*. Radula observations may permit definitive separation.

ACKNOWLEDGMENTS

The author thanks Kirk Anders, Twila Bratcher, Billee Dilworth, Helen DuShane, James McLean, Donald Pisor, Ruth Purdy, Donald Shasky, and Carol Skoglund who made the *Cypraea* specimens available for study. David K. Mulliner made the publication prints from my original slides. The work was supported in part by a grant from the Foundation For Ocean Research.

LITERATURE CITED

BRADNER, HUGH
1982 SEM Studies of *Cypraea* radulae II. The Western Society of Malacologists, Annual Report 15:16.
BURGESS, C.M.
1970 THE LIVING COWRIES. A.S. Barnes, New York (pp. 347,348).
CERNOHORSKY, WALTER O.
1971 MARINE SHELLS OF THE PACIFIC (Revised edition). Pacific Publ., Sydney, N.S.W. (p.62).
DALL, W.H.
1909 Some notes on *Cypraea* of the Pacific coast, Nautilus 22(12):125
KEEN, A. MYRA
1971 SEA SHELLS OF TROPICAL WEST AMERICA (Second edition). Stanford Univ. Press, Stanford, CA, (p. 495).
SCHILDER, F.A.
1930 Beitrage zur kenntnis der Cypraeacea III. Zool. Anz. 92:67,68.
1933 Beitrage zur kenntnis der Cypraeacea VI/18. Zool. Anz. 101:187,193.
WAGNER, ROBERT J.L. & R. TUCKER ABBOTT
1978 WAGNER AND ABBOTT'S STANDARD CATALOG OF SHELLS (Third edition). American Malacologists, Inc. Greenville, DE (pp. 10-403).

IN MEMORIAM

Sadly, we report the passing, on 21 May 1985, of longtime member Frank Good of a heart attack.

While Frank was not a shell collector, he actively encouraged the interest of his wife, Barbara and supported the Club by donating his services as its attorney. It was primarily through his efforts that our Club was incorporated in 1968. In gratitude for the many services he provided in the Club's behalf, he was made an honorary member--one of only three in the Club's history.

Our sympathy is extended to Barbara, their son Rick and their family.

ILLUSTRATIONS OF RECENT PYGMAEPTERYS : MURICOPSINAE

BY

ANTHONY D'ATTILIO and BARBARA W. MYERS

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In 1978, two years following publication of "The Murex Book" (Radwin & D'Attilio 1976), E.H. Vokes erected *Pygmaepterys* as a subgenus of *Pterynotus* Swainson, 1833 in the subfamily Muricinae. She designated *Murex alfredensis* Bartsch, 1915 as the type and named *Pygmaepterys maraisi* from South Africa as a new species.

She described *Pygmaepterys* as small for a *Pterynotus*, with six winged varices, strong spiral cords and numerous axial lamellae; the aperture denticulate on the outer lip and occasionally with small denticles on the inner lip. The type species *P. alfredensis* is a small (6 mm) specimen, very worn, with the early whorls and varices eroded. The shoulder is concave and the suture deeply impressed. It is illustrated here in Figure 1 taken from Bartsch (1915). The type locality is Port Alfred, South Africa.

Fig 1. Holotype of *P. alfredensis* (Bartsch, 1915) USNM 227763, 6 x 3 mm From Bartsch (1915)

The radula of *Pygmaepterys germainae* Vokes & D'Attilio, 1980 and *P. poormani* (Radwin & D'Attilio, 1976) have been studied and both proved to be typically muricopsine, making necessary the reassignment of *Pygmaepterys* to Muricopsinae.

Since 1978, seven Recent species have been assigned to the genus *Pygmaepterys* and they are figured in this paper.

Family MURICIDAE

Subfamily MURICOPSINAE

Genus *Pygmaepterys* Vokes, 1978
Annals of the Natal Museum 23(2):398-400

alfredensis (Bartsch, 1915). South African marine mollusks. Bull.USNM 91:59, pl.37, fig. 6. Port Alfred, South Africa. Figure 1.

bellini D'Attilio & Myers, 1985. A new species of *Pygmaepterys* Vokes from the western Pacific (Gastropoda: Muricidae). Nautilus 99(1):9-12. figs. 1-4. Okinawa and Philippine Islands. Figures 2 and 3.

funafutiensis (Hedley, 1899). The Mollusca of Funafuti. Mem. Austral. Mus.3(7): 458, fig. 35. Funafuti Atoll, Tuvalu; Hawaii and Philippine Islands. Figures 4 and 5.

germainae Vokes & D'Attilio, 1980. *Pygmaepterys*, a newly described taxon of Muricidae (Mollusca:Gastropoda), with the description of three new species from the Cenozoic of the western Atlantic. Tulane Studies in Geol. & Paleo. 16(2):50-52, pl. 1, figs. 1-4, radula text fig. 1. Puerto Rico to Panama. Figure 6.

juanitae Gibson-Smith & Gibson-Smith, 1983. New Recent gastropod species from Venezuela and a bivalve range extension. Veliger 25(3):179-180, figs. 6,7. North coast of Venezuela from Tucacas, State of Falcon to Playa Colorada, State of Sucre. Figure 7.

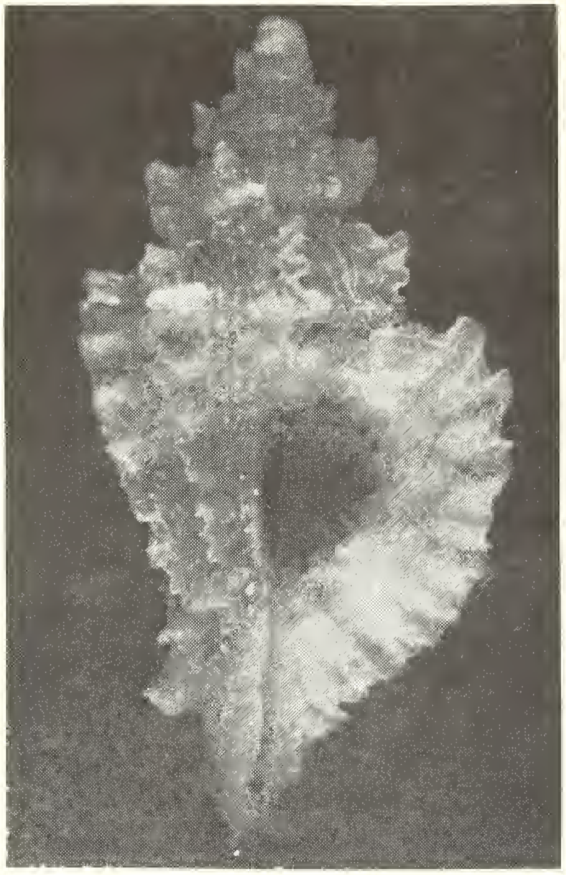

Fig. 2. *Pygmaepterys bellini*, apertural view of holotype SDNHM 83065, 9.9 x 5.5mm

Fig. 3. dorsal view of holotype of *P. bellini*. Photos: D.K. Mulliner

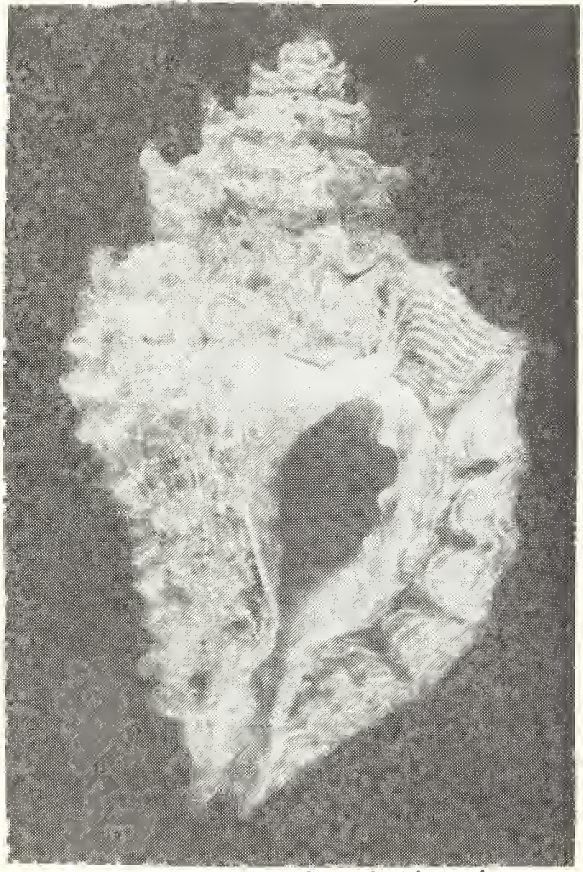

Fig. 4. *Pygmaepterys funafutiensis*, 12.0 x 7.2mm, Donald Pisor collection Philippine Islands

Fig. 5. Dorsal view of specimen in Figure 4. Photos: D.K. Mulliner

lourdesae Gibson-Smith & Gibson-Smith, 1983. New Recent gastropod species from Venezuela and a bivalve range extension. Veliger 25(3):180, figs. 8,9. Offshore islands along the north coast of Venezuela. Figure 8

maraisi Vokes, 1978. Muricidae (Mollusca : Gastropoda) from the eastern coast of Africa. Ann. Natal Museum 23(2):400-401, pl. 7, fig. 2. Mzamba, E. Pondoland, Transkei, South Africa. Figure 9.

philcloveri (Houart, 1984). *Poirieria (Pazinotus) philcloveri,* a new species from the Philippine Islands (Gastropoda : Muricidae : Muricinae). Informations: 12(2-3):127-130, pl. 1. Mindanao Island, Philippine Islands. Figures 10, 11.

poormani (Radwin & D'Attilio, 1976). MUREX SHELLS OF THE WORLD,Stanford Univ. Press. p. 231, pl. 24, fig. 9,(radula) figs. 180, 181, Bahia San Carlos, Guaymas, Sonora, Mexico and Islas Perlas, Panama. Figure 12.

Pygmaepterys sp. Indian Ocean. Previously figured as *Pygmaepterys* cf *P. alfredensis* in Vokes & D'Attilio (1980) [see above] pl.2, figs. 2a-c and Houart (1979) in Informations de la Soc. Belge Malac., ser. 7(1):5-6, figs. 1a-c.

Fig. 6. *Pygmaepterys germainae,* dorsal view of Paratype (B) SDNHM 71305, 8.6 x 4.6mm, Grenada, West Indies
Photo: E.H. Vokes

Fig. 7. *Pygmaepterys juanitae,* two views of holotype USNM 794694, 7.6 x 3.7mm North coast of Venezuela. Reproduced from Gibson-Smith & Gibson-Smith (1983).

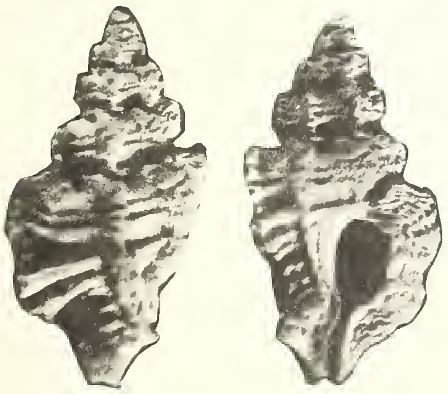

Fig. 8. *Pygmaepterys lourdesae,* two views of holotype USNM 784695, 6 x 3.3mm, off-shore islands, north coast of Venezuela. Reproduced from Gibson-Smith & Gibson-Smith (1983).

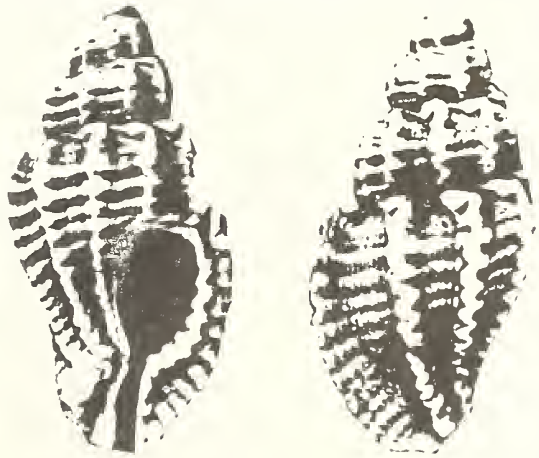

Fig. 9. *Pygmaepterys maraisi,* two views of holotype, Natal Mus. A5048/T2132 5.7 x 2.6mm, known only from beach collections, Transkei, South Africa. Reproduced from Vokes (1978).

Fig. 10. *Pygmaepterys philcloveri*, SDNHM 83068, 13.7 x 8.0 mm, Philippine Islands.

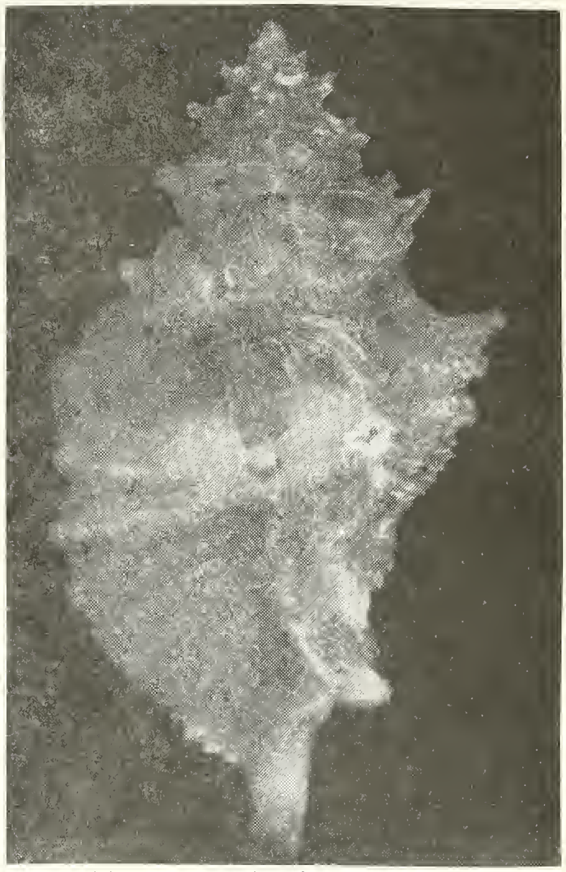

Fig. 11. Dorsal view of specimen shown in Figure 10.

Photos: D.K. Mulliner

Fig. 12. *Pygmaepterys poormani*, holotype SDNHM 63080, 19.2 x 11.5 mm, Bahía San Carlos, Sonora, Mexico. Photo: D.K. Mulliner

ACKNOWLEDGMENTS

We wish to thank David K. Mulliner for the photographs of *P. bellini*, *P. funafutiensis*, *P. philcloveri*, and *P. poormani*, and we also wish to thank Roland Houart for the loan of his *Pygmaepterys* specimen.

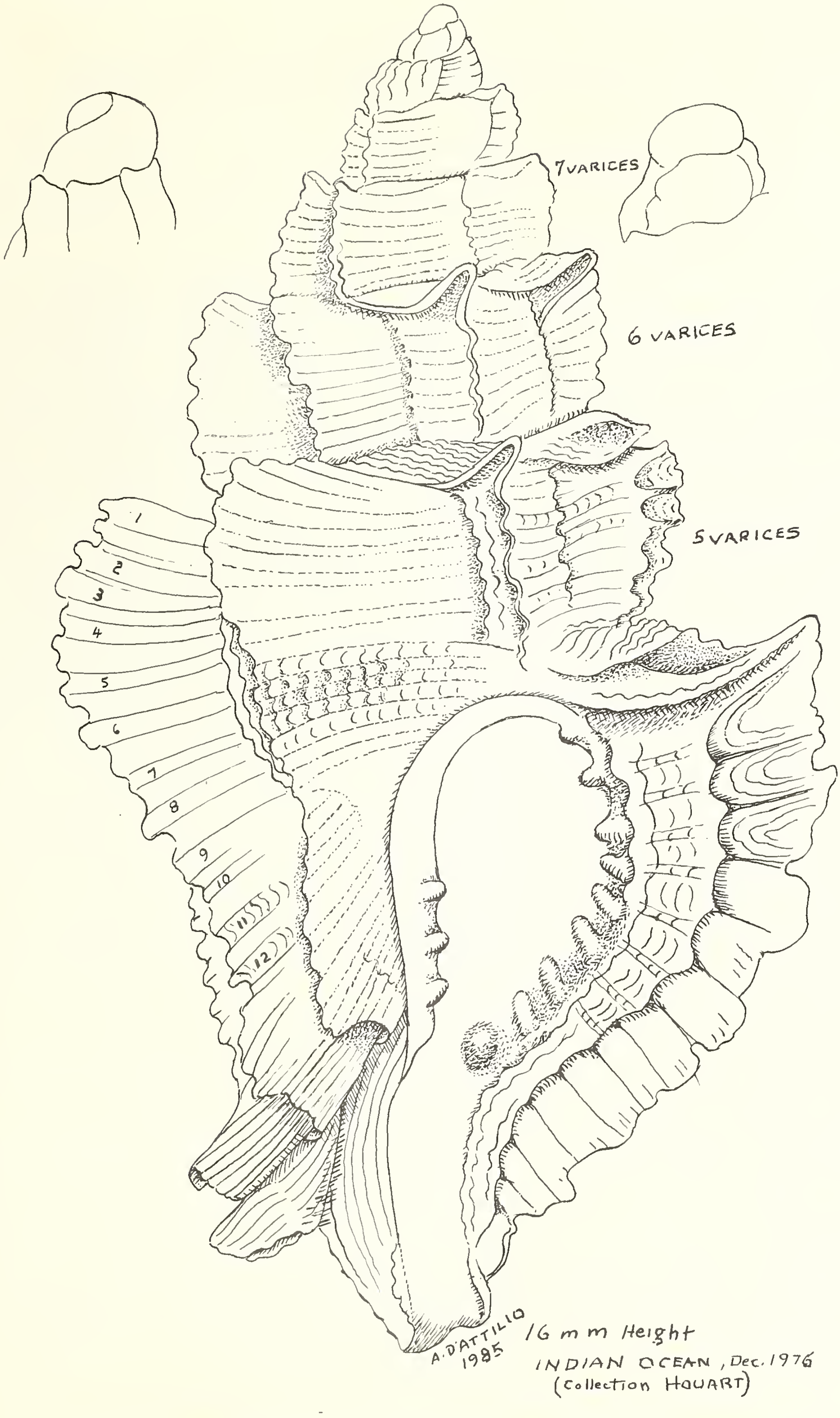

Fig. 13. *Pygmaepterys* sp. Detail drawing of a specimen in the collection of Roland Houart, Belgium with two views of the protoconch. 16mm., Indian Ocean.

RETINOL AND OPHIUROIDEA AUTOTOMY 1985 COMPLETED RESEARCH

BY

LORRI JEAN HAMMER*

10227 Avenida Magnifica, San Diego, California 92131

This project was set up to determine if Retinol or Vitamin A in a water soluble form would increase the regenerative factors of Ophiuroidea, specifically brittle stars, caused by limb autotomy. The brittle stars were collected, by a special permit, directly from the tide pools and varied in species. Three five gallon saltwater tanks were set up for the experiment. An initial period of 20 days was allotted for tank conditioning before experimentation. Problems developed on the 15th day and abnormally high ammonia concentrations showed up in tests. A complete water change and switch to undergravel filters were recommended. On day 20 the ammonia level in the tank was low enough to be able to start the experimentation. The autotomy, or breakage and release of a limb from stress or injury, was simulated by cutting off the limb 2 cm from the central disc. In each of the tanks, 10 brittle stars were used as follows: 2 remained uncut, 2 with 1 limb cut, 2 with 2 limbs cut, 2 with 3 limbs cut, 2 with 4 limbs cut. The Vitamin A was added to one tank in a high concentration (40,000 I.U. per 5 gallons seawater), one tank in a low concentration (20,000 I.U. per 5 gallons seawater) and one tank remained the control without any. A 25% water change was done every two weeks to attempt to correct the high ammonia problem, thus diluting the initial concentration each time. The results to that point only showed that the Vitamin A is a toxin in sea water as originally believed and that the concentration might be too high.

On day 24, random limb autotomy was noticed in the tank with a high concentration of Vitamin A. It occurred to four of the brittle stars and is believed to be a possible result of the high ammonia level. Several deaths in different tanks were also noted by that date. Regeneration finally began showing on day 36 both in the tank with the high concentration of Vitamin A and in the control tank. By day 65 a very high nitrite level had been noticed and limb regeneration and growth of only less than 5 mm was measured. As a result of the bacterial problems of the nitrite ions, the experiment was ended on day 72 to prevent any unnecessary harm to the invertebrates.

The final results showed, as explained above, that the low concentration of Vitamin A was the overall best stimulant in the regeneration and showed the greatest increase in growth rate overall. The control showed random growth rates as expected and the high concentration seemed to inhibit the growth (normal or regenerative), thus proving the hypothesis correct.

*San Diego Shell Club Science Fair award winner, 1985. Abstract of project.

NEW MEMBERS

Montoya, Michel, P.O. Box 4830, Managua, Nicaragua

Vokes, Emily, Department of Geology, Tulane University, New Orleans, LA 70118

CHANGE OF ADDRESS

Diegel, Phyllis, 143 Alcazar St., Royal Palm Beach, FL 33411

TOO LATE FOR THE ROSTER

Auckland Institute and Museum, Private Bag, Auckland, New Zealand
Smithsonian Institution, Serials Library, Washington, DC 20560

BOOK REVIEW

SAUDI ARABIAN SEASHELLS
Selected Red Sea and Arabian Gulf Molluscs
By Doreen Sharabati
119 pages, colored illustrations, hardbound
Published by Doreen Phillips Sharabati
Price: $24.95

The title of this book may give the mistaken impression that it is a picture book of the seashells of the two geographical areas mentioned. However, the table of contents is more informative of the book's contents and intentions. After a forward by Dr. R. Tucker Abbott, the first 55 pages (nearly half of the total number in the book) concern geography of the area, biology and uses of seashells, biogeography, ecology, conservation etc. followed by a glossary, bibliography and index.

For the traveler intending to visit and explore the area for some time, the book is of first rate interest. Even for the homebody who gets pleasure out of reading all about the world in publications like the NATIONAL GEOGRAPHIC, this is still a fine treatment of the geographic area and sea bottom.

The actual numbers of seashells illustrated are comparatively few and these are photographed more or less as they are found in habitat or strewn haphazardly on sand for artful effects. The coloring is excellent and is especially effective on the nudibranchs and some few other invertebrates shown. As a whole though the book may be disappointing for shell collectors, though the more scientific treatment of the numerous types of habitats, where found, biology, etc. are highly instructive.

A shell book on the Red Sea is badly needed for the student or professional malacologist. Sporadic treatments of the mollusk fauna of the Red Sea and the nearby horn of Africa have been few and most are old and not accessible except in large scientific libraries. In a recent book by Donald and Eloise Bosch, SEASHELLS OF OMAN, published in 1982, the Gulf of Oman seashells are enumerated and illustrated very well. It is interesting that though used by man for so many centuries, the fauna of the Red Sea is still poorly known. Some collecting by modern methods has been done mainly in the Gulf of Aqaba by Israeli fishermen.

Curiously enough, the map on page 14 of SAUDI ARABIAN SEASHELLS, clearly prints the names of all Islamic countries but fails to designate the map of Israel at all, whose port at Eilat in the Gulf of Aqaba, is best known to American and European shell collectors.

CLUB NEWS

PUBLICATIONS RECEIVED FOR THE LIBRARY

The library has received a bound copy of volumes 1-4 of The Veliger from Dr. William Newman of Scripps Institution of Oceanography. It is through such generous donations that the Club library has become a valued holding of the membership.

HOBBY FAUNA International News, a complimentary issue of a new magazine "dedicated to Nature and in particular...Malacology, Entomology, Herpetology." This magazine, published in Italy on high quality paper with exceptional color photographs, is written in both Italian and English. This issue has six illustrated articles on shells. The subscription rate for 12 issues is $36. It will be available at the June meeting.

FROM THE MINUTES - SAN DIEGO SHELL CLUB MEETING - 16 MAY 1985

Poster size photos and a water buffalo standing two feet high and weighing 40 pounds carved from lustrous dark wood dominated the interesting display of rare shells, objets d'art, books and pamphlets acquired by David K. Mulliner and Robert Yin on their recent trip to the Philippine Islands. The beautiful slides from the trip, taken by both Dave and Bob, showed us several of the islands and introduced us to some of the culture and customs of the people. The underwater pictures of colorful corals, sponges, fish and nudibranchs were top quality. The display of rare shells included *Cypraea leucodon* Broderip, 1828; *C. valentia* Perry, 1811; *C. porteri* Cate, 1966; *Conus gloriamaris* Chemnitz, 1777; *C. excelsis* Sowerby, 1908; *Pterynotus loebbecki* Kobelt, 1879; and *P. miyokoae* Kosuge, 1979.

Winner of the San Diego Shell Club Science Fair award, Lorri Jean Hammer, an eleventh grader at Gompers High School, presented a synopsis of her research project and received her Club book award. She chose Ricketts and Calvin's BETWEEN PACIFIC TIDES. Lori was chosen, one of five, from the Science Fair participants to attend and compete at the Junior Science and Humanities Symposium in Los Angeles in December. She was awarded a grant by this symposium to continue her research and will attend the National Science competition next May. (See a brief outline of her project on page 64. Ed.).

Wes Farmer, our Botanical Foundation representative, announced the annual plant sale of the Foundation at the Casa del Prado on May 25th and 26th from 10:00 A.M. to 4:00 P.M. Our Club was asked to donate to this sale and requested to bring plants to Rm. 104 on May 24th.

A motion to increase our annual dues beginning in 1986 was made by Dee Miller. Dues would be $10.00 single; $12.00 family; $12.00 overseas (surface mail). The motion was seconded by Robert Yin. The vote was overwhelmingly in favor of the increase.

Barbara Myers, Secretary

FOR YOUR INFORMATION

UPCOMING MEETINGS

The Conchologists of America (COA) will hold their annual meeting in Philadelphia from June 22-26, 1985 at the Academy of Natural Sciences of Philadelphia with accommodations at nearby hotels. For reservation information write: Frank Roach, 1028 Belvoir Rd., Norristown, PA 19401

The American Malacological Union (AMU) will hold its 51st annual meeting from July 28-August 3, 1985 at the University of Rhode Island at Kingston. For further information write: Dr. M.R. Carriker, College of Marine Studies, Univ. of Delaware, Lewes DE 19958.

The Western Society of Malacologists (WSM) will hold its annual meeting from August 18-21, 1985 on the campus of the University of California, Santa Barbara. Emphasis will be on molluscan fauna of the eastern Pacific with sessions on terrestrial snails, paleontology etc. A special symposium on Hawaiian mollusks chaired by Beatrice Burch is planned.

A NEW EXHIBIT ON MOLLUSKS

The Department of Marine Invertebrates (Malacology) of the San Diego Natural History Museum will present a new exhibit of specially selected "gems of the ocean" from the Department's collection. TDe exhibit entitled, "Rare, Rediscovered, and Newly Described Mollusks," will open to the public on Monday, June 24, 1985. Members of the San Diego Shell Club are invited to a preview reception on Friday, June 21 from 6:00 to 8:00 PM.

THE FESTIVUS

A publication of the San Diego Shell Club

ISSN: 0738-9388

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MEMBERSHIP AND SUBSCRIPTION

Annual dues are payable to San Diego Shell Club. Single member: $7.00; Family membership: $8.00; Overseas (surface mail): $10.00

Address all correspondence to the San Diego Shell Club, Inc., c/o 3883 Mt. Blackburn Ave., San Diego, CA 92111

Single copies of this issue: $5.00. Postage is additional.

Meeting date: third Thursday, 7:30 P.M. Room 104, Casa Del Prado, Balboa Park

PROGRAM

"Escondido Bay--Revisited 1985"

The annual Easter trip to Escondido Bay, Baja California for diving, dredging and photography will be the subject for this talk by Ron McPeak who will present his slides as well as those contributed by other travelers in the group.

Meeting date: July 18, 1985

CONTENTS

Publication date: The publication date of The Festivus appears on the masthead above. The Festivus is published monthly except December.

The Festivus welcomes all contributions which further the understanding of mollusks. Both popular and scientific articles are actively solicited. At this time The Festivus does not publish descriptions of new taxa.

THE FAMILY EPITONIIDAE OF PANAMA BAY

BY

HELEN DUSHANE

15012 El Soneto Drive, Whittier, California 90605

INTRODUCTION

Not since the reports of C.B. Adams (1852), Carpenter (1856), Dall (1917), and Zetek (1918) has a comprehensive list been made of the epitoniids of the Gulf of Panama. There have been a few sporadic reports of epitoniids collected during vaious expeditions, usually duplications of former information. Some of the names on the early lists were synonymized by me (DuShane 1974). The information for the current list was obtained on three trips made to the area during the years 1979, 1980, and 1981. In all, intertidal collections were made at six stations within Panama Bay and at five islands of the Perlas Archipelago in the Gulf of Panama.

The Gulf of Panama lies within a tropical zone in 7° to 8° north latitude from Cape Mala to the southern boundary of Panama. It encompasses Panama Bay and the many islands of the Perlas Archipelago. The surface temperature of the water near the inshore intertidal areas ranges from 24°C to 28°C in January and February and 21°C to 29°C in March. These were the months in which intensive collections of epitoniids were made. Salinity usually varies from 3.5 to 3.7% (Smithsonian Tropical Research Institute Records for 1982). Substrates vary from calcareous silt to sheet rock and boulder and support a rich environment of colonial anemones and algae. Most habitats in Panama Bay are well sheltered from heavy wave action.

HISTORICAL BACKGROUND

During the six years Zetek spent in Panama as an entomologist, he compiled a list of 684 species of mollusks, 17 of which are epitoniids. In his list Zetek (1918:47) added four species that "muy probablemente existen en aguas panamenas" *Epitonium ducale* (Mörch, 1875), *Epitonium elenense* (Sowerby, 1844), *Epitonium obtusum* (Sowerby, 1844), and *Epitonium politum* (Sowerby, 1844). All but *E. politum* have been collected recently from Panama Bay. Dall (1917) in his notes on the genus *Epitonium* had listed 15 species from Panama, nine species endemic to Panama Bay. Of these, seven were new species described by Dall, five of which later were placed in synonymy by me (DuShane (1974). Two of Dall's 1917 species (*Epitonium columnella* and *E. tabogense*) have not been reported since Zetek (1918). The paucity of dredging records may account for the lack of specimens of *Epitonium columnella* which was described from deep water (54m). *Epitonium tabogense*, dredged off Taboga Island in 11m, is in such poor condition that it might be one of several species from that locality.

The one epitoniid species described by C.B. Adams (1852) from Panama, *Rissoina infrequens*, was later found to be an *Opalia* (DuShane 1974). The two new species described by Strong & Hertlein (1939), *Asperiscala slevini* and *Nitidiscala gissleri* from Panama Bay have been synonymized by me (DuShane 1974) with species named earlier. Mr. T. Bridges, who collected prior to 1856 in Panama Bay, returned with five epitoniid species thought to be new to science. These were described by Carpenter (1856). Of these *Scalaria tiara* and *S. subnodosa* were synonymized by DuShane (1974) with species perviously described by Sowerby (1844). *Scalaria cumingii, S. hindsii,* and *S. regularis* are valid species, although the last named was not found by me on the three trips between 1979 and 1981. See Table I.

ECOLOGY

Most epitoniids of Panama Bay are parasitic on actiniarians. They live in association intertidally with their host coelenterate in coarse sand pockets on

TABLE I. EPITONIIDS FROM PANAMA BAY

The epitoniid species cited by Dall (1917) and Zetek (1918) and those found by DuShane on her three trips to the area from 1979 to 1981 are listed. An asterisk denotes the presence of the species.

SPECIES	DALL (1917)	ZETEK (1918)	DUSHANE 1979-1981 COLLECTIONS
Alora gouldii (A. Adams, 1857)			*
Amaea (Scalina) tehuanarum DuShane & McLean, 1968			*
Asperiscala billeeana (DuShane & Bratcher, 1965)			*
Asperiscala canna (Dall, 1919)			*
Asperiscala elenense (Sowerby, 1844)	*	*	*
Asperiscala gradata (Sowerby, 1844)			*
Asperiscala huffmani (DuShane & McLean, 1968)			*
Asperiscala indistincta (Sowerby, 1844)			*
Asperiscala lowei (Dall, 1906)			*
Asperiscala minuticosta (DeBoury, 1912)	*	*	
Asperiscala regulare (Carpenter, 1856)	*	*	
Asperiscala tinctoria (Dall, 1919)			*
Asperiscala zeteki (Dall, 1917)	*	*	*
Depressiscala polita (Sowerby, 1844)		*	
Depressiscala purpurata (Dall, 1917)	*	*	*
Gyroscala lamellosa (Lamarck, 1822)	*	*	*
Hirtoscala mitraeforme (Sowerby, 1844)			*
Hirtoscala replicata (Sowerby, 1844)		*	
Nitidiscala callipeplum (Dall, 1919)			*
Nitidiscala columnella (Dall, 1917)	*	*	
Nitidiscala cumingii (Carpenter, 1856)	*	*	*
Nitidiscala curvilineata (Sowerby, 1844)	*	*	
Nitidiscala ducale (Mörch, 1875)		*	*
Nitidiscala hexagona (Sowerby, 1844)	*	*	*
Nitidiscala hindsii (Carpenter, 1856)	*	*	*
Nitidiscala obtusa (Sowerby, 1844)	*	*	*
Nitidiscala statuminata (Sowerby, 1844)	*	*	*
Nitidiscala skoglundae (DuShane, 1974)			*
Nitidiscala tabogense (Dall, 1917)	*	*	
Opalia crenatoides (Carpenter, 1864)			*
Opalia diadema (Sowerby, 1832)			*
Opalia funiculata (Carpenter, 1857)			*
Opalia mexicana (Dall, 1908)			*
Opalia paulula DuShane, 1974			*
Opalia sanjuanense (Lowe, 1932)			*
Sthenorytis dianae (Hinds, 1844)			*

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Alora gouldii (A. Adams, 1857)			*
Amaea (Scalina) tehuanarum DuShane & McLean, 1968			*
Asperiscala billeeana (DuShane & Bratcher, 1965)			*
Asperiscala canna (Dall, 1919)			*
Asperiscala elenense (Sowerby, 1844)	*	*	*
Asperiscala gradata (Sowerby, 1844)			*
Asperiscala huffmani (DuShane & McLean, 1968)			*
Asperiscala indistincta (Sowerby, 1844)			*
Asperiscala lowei (Dall, 1906)			*
Asperiscala minuticosta (DeBoury, 1912)	*	*	
Asperiscala regulare (Carpenter, 1856)	*	*	
Asperiscala tinctoria (Dall, 1919)			*
Asperiscala zeteki (Dall, 1917)	*	*	*
Depressiscala polita (Sowerby, 1844)		*	
Depressiscala purpurata (Dall, 1917)	*	*	*
Gyroscala lamellosa (Lamarck, 1822)	*	*	*
Hirtoscala mitraeforme (Sowerby, 1844)			*
Hirtoscala replicata (Sowerby, 1844)		*	
Nitidiscala callipeplum (Dall, 1919)			*
Nitidiscala columnella (Dall, 1917)	*	*	
Nitidiscala cumingii (Carpenter, 1856)	*	*	*
Nitidiscala curvilineata (Sowerby, 1844)	*	*	
Nitidiscala ducale (Mörch, 1875)		*	*
Nitidiscala hexagona (Sowerby, 1844)	*	*	*
Nitidiscala hindsii (Carpenter, 1856)	*	*	*
Nitidiscala obtusa (Sowerby, 1844)	*	*	*
Nitidiscala statuminata (Sowerby, 1844)	*	*	*
Nitidiscala skoglundae (DuShane, 1974)			*
Nitidiscala tabogense (Dall, 1917)	*	*	
Opalia crenatoides (Carpenter, 1864)			*
Opalia diadema (Sowerby, 1832)			*
Opalia funiculata (Carpenter, 1857)			*
Opalia mexicana (Dall, 1908)			*
Opalia paulula DuShane, 1974			*
Opalia sanjuanense (Lowe, 1932)			*
Sthenorytis dianae (Hinds, 1844)			*

large boulders on the sandy sheet reef. Light to dark brown in color, these anemones cluster in groups or colonies on large boulders in the low intertidal and subtidal zones. Most epitoniids live at the base of the colonial anemones, half hidden by sand. However one unusual epitoniid, *Asperiscala billeeana* (DuShane & Bratcher, 1965), feeds on the red coral *Tubastrea aurea* (Quoy & Gaimard, 1824). It is believed that its prey is located over short distances by chemotaxis (Perran 1978).

All anemones observed by me were of the clonal aggregate type. Although most anemone species on the west coast of South America are endemic (Sebens & Paine 1978) there seems to be no information available for areas north of Lima, Peru. Charles E. Cutress, University of Puerto Rico, suggested (pers. comm.) that if the range of substrates exist in Panama Bay as in the greater Gulf of Panama and salinities are equivalent, one could expect to find the same species of anemones in both places. However, there seems to have been no study made of these factors. He also suggested that the small, "grey aggregating" anemones found intertidally are likely to be *Anthopleura dowii* Verrill, 1869.

According to Brusca (1973), colonial or aggregate anemones differ from others in the arrangement of the septa. A pedal disk is absent. The oral disk bears a marginal circle of short tentacles. The column is covered by a thick cuticle. Large, solitary anemones common along the southern California coast and in the Gulf of California were not observed in the intertidal zone, probably because they require heavy wave action where dislodged prey is available.

COLLECTING LOCALITIES

Locations from which collections were made intertidally are as follows: Amador Causeway, Farfan Beach, Bique, Palo Seco, Vera Cruz, Venado Island and surrounding tidal flats. Within the Perlas Archipelago, collections were made on the following islands: Bajo Boyarena, Contadora, Pacheco, Pajaros, and Trapiche. Twice in each twenty-four hour period collections were made during extreme low tides. Tidal ranges varied from -0.9 to -3.0 feet. Collecting at night required the use of a gasoline lantern and was always limited, for reasons of safety, to keeping within sight of another collector's lantern.

One useful method of obtaining epitoniid specimens is washing the aggregate anemones on boulders or sheet reef with a pint container of sea water and sucking up the epitoniids that appear with a large kitchen baster used for roasts.

Nitidiscala cumingii (Carpenter, 1856) (Figure 1) was collected in large numbers under rocks with small aggregate anemones on Isla Bajo Boyarena and on the mainland from Amador Causeway, Bique, Farfan Beach and Palo Seco. On the same island, *Asperiscala billeeana* (DuShane & Bratcher, 1965), formerly recorded only subtidally, was taken intertidally with egg clusters from the red-orange coral *Tubastrea aurea* (Quoy & Gaimard, 1824). The *Tubastrea* was attached to enormous boulders on a small sand reef at a -2.5 foot tide. One specimen of *Asperiscala tinctoria* (Dall, 1919) (Figure 2) was taken intertidally under a rock on the same island. Off Isla Contadora, *Asperiscala billeeana*, with strings of egg capsules linked by chalazae was taken diving in 10 to 15 feet of water from the same type of coral. Off Pacheco Island, a record size specimen (37.8mm length, 23.2 mm width) of *Alora gouldii* (A. Adams, 1857) was taken live (Callaway collection). Previously known as a dredged species, large numbers were taken on sheet reef at Farfan Beach and Vera Cruz from among anemones (Figure 3). At Isla Trapiche, I collected four specimens of *Asperiscala zeteki* (Dall, 1917) and two specimens of *Opalia funiculata* (Carpenter, 1857) both species found under rocks. Two specimens of *Asperiscala zeteki* from Fort Amador are shown in Figure 4.

Asperiscala huffmani (DuShane & McLean, 1968), uncommon elsewhere in the Panamic province, is common among colonial anemones on boulders at Amador Causeway. Live taken specimens exude a purple protein dye. The exact cause or reason for this is unknown.

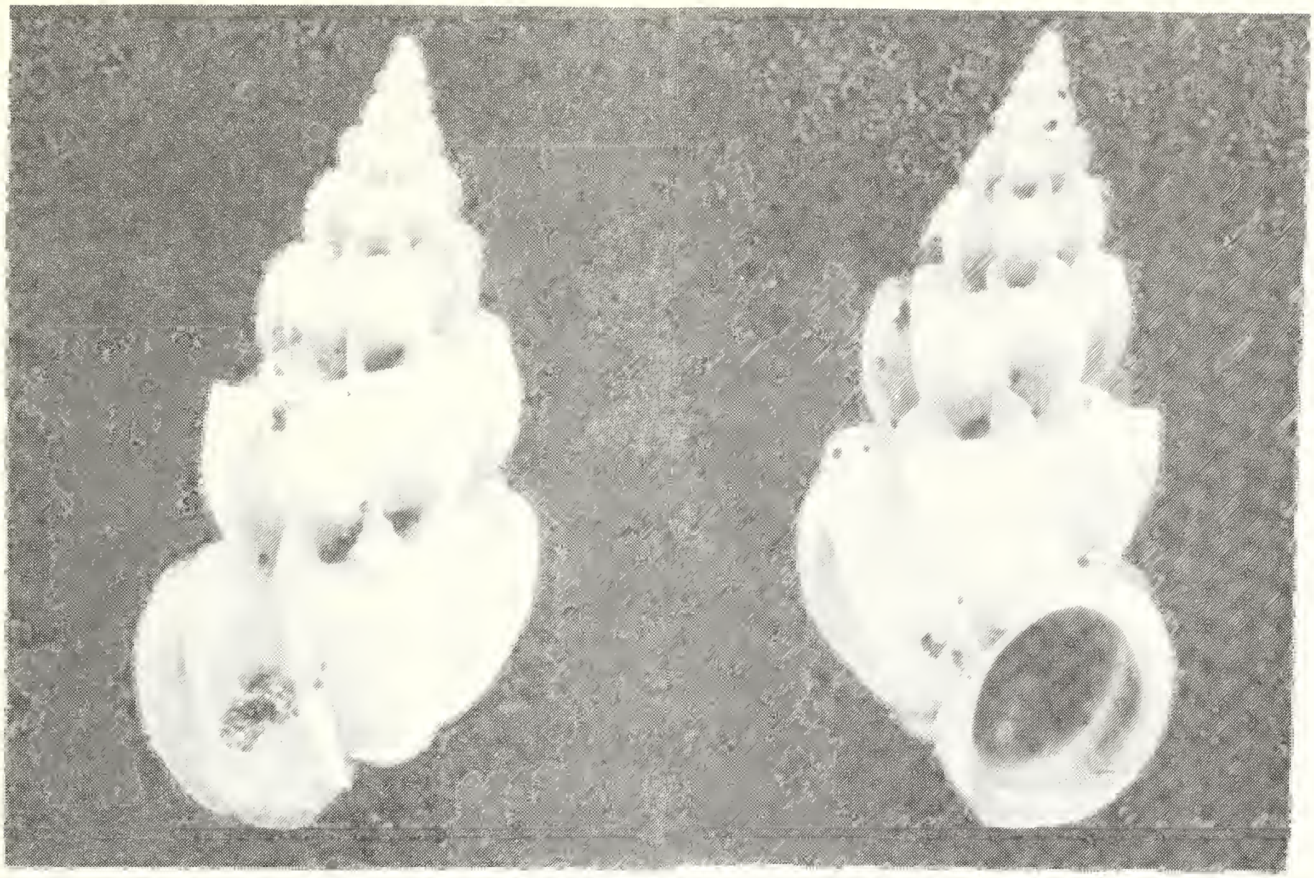

Fig. 1. Two views of *Nitidiscala cumingii* (Carpenter, 1856). 9.5mm L x 4mm W
Farfan Beach, Panama Bay, Panama, at base of colonial anemones on sheet reef, with egg capsules.

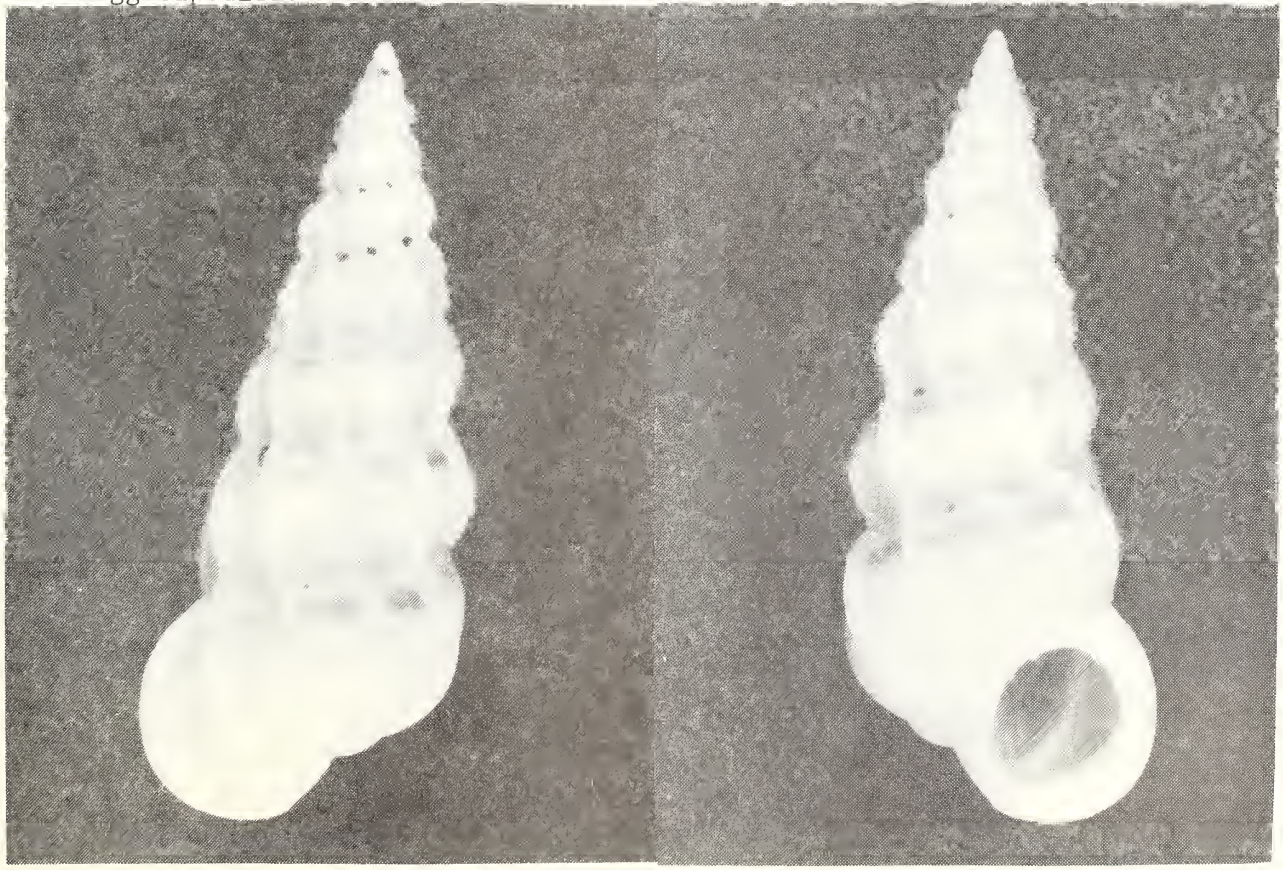

Fig. 2. Two views of *Asperiscala tinctoria* (Dall, 1919). 8.5mm L x 3mm W
Isla Bajo Boyarena, Perlas Islands, Panama, collected under rocks.

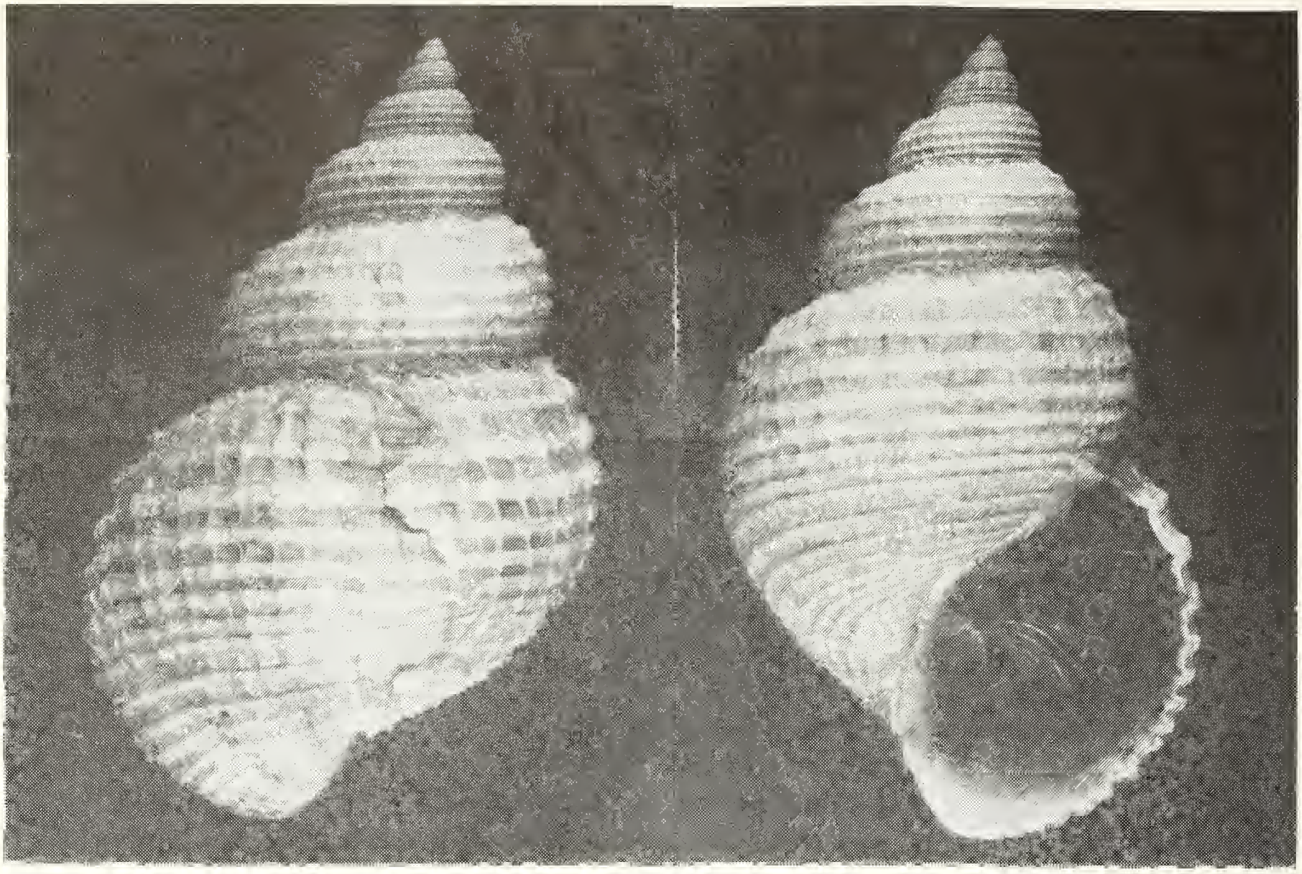

Fig. 3. Two views of *Alora gouldii* (A. Adams, 1857) 22mm L x 13mm W
Farfan Beach, Panama Bay, Panama., on sheet reef with colonial anemones.

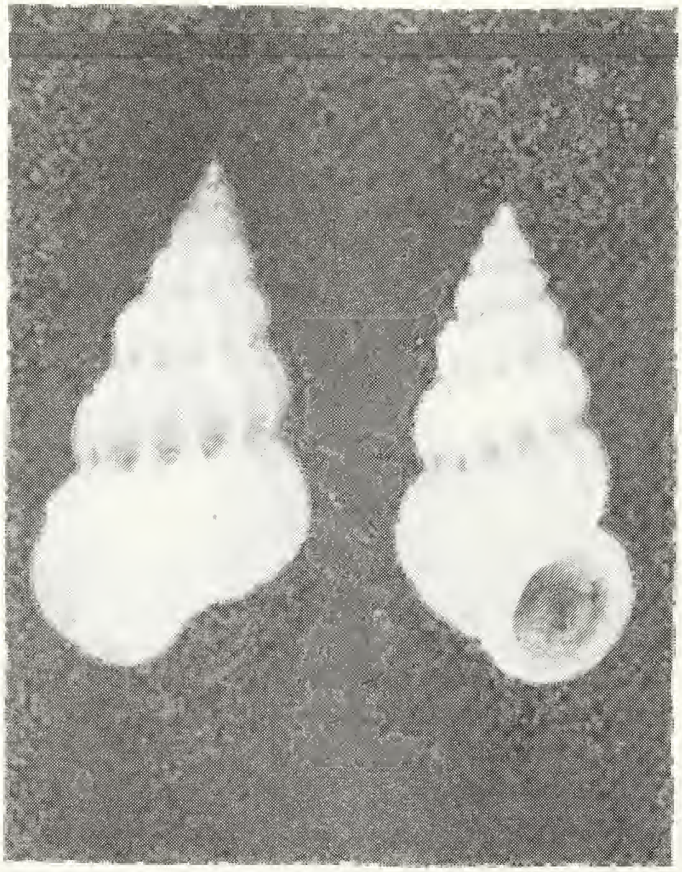

Fig. 4. *Asperiscala zeteki* (Dall, 1917) Larger specimen on left 6mm L x 3mm W; smaller specimen (right) 5mm L x 2.5mm W
Fort Amador, Panama Bay, Panama, on colonial anemones, with strings of egg capsules

Asperiscala indistincta (Sowerby, 1844) common among rocks, have very small shells (1.5mm length; 0.5mm width), compared to specimens from other areas of the Panamic province (2-23mm length; 0.5-7mm width). This may indicate a stressful ecological habitat and is a question that requires further study.

Nitidiscala hexagona (Sowerby, 1844), was found throughout the Gulf of California, Mexico to Magdalena Bay on the west side of Baja California, Mexico. It is strangely absent from the mainland coast of Mexico south to Acapulco whence its disjunct range extends to Panama where it is taken occasionally.

Nitidiscala statuminata (Sowerby, 1844), with a distribution from Mazatlan, Mexico to Peru is usually dredged, but at Farfan Beach on a low night tide numerous live specimens were taken (Figure 5). Curiously, specimens were only seen coming out of the mud beside large watermelon-sized rocks; none were observed on the extensive tidal flats. They were found with no actiniarians in sight, and found only during low night tides (-0.2 to -0.9 ft). The emergence of this epitoniid from the silty mud is interesting to watch. The nuclear whorls, with costae already formed, show in the black mud like a shiny white bead. With a turning motion the entire shell slowly rotates out of the substrate. (Can it be speculated that in its search for food, the large, reflected, rounded costae help the animal to slip from its subsurface habitat in the mud)? As soon as *N. statuminata* is completely revealed beside a rock, it extends its proboscis and waving it from side to side, slowly climbs the rock. Once on top, as if feeding, specimens were observed extending their proboscises into the tubes of old vermetids which covered the upper, outer surfaces of the rocks.

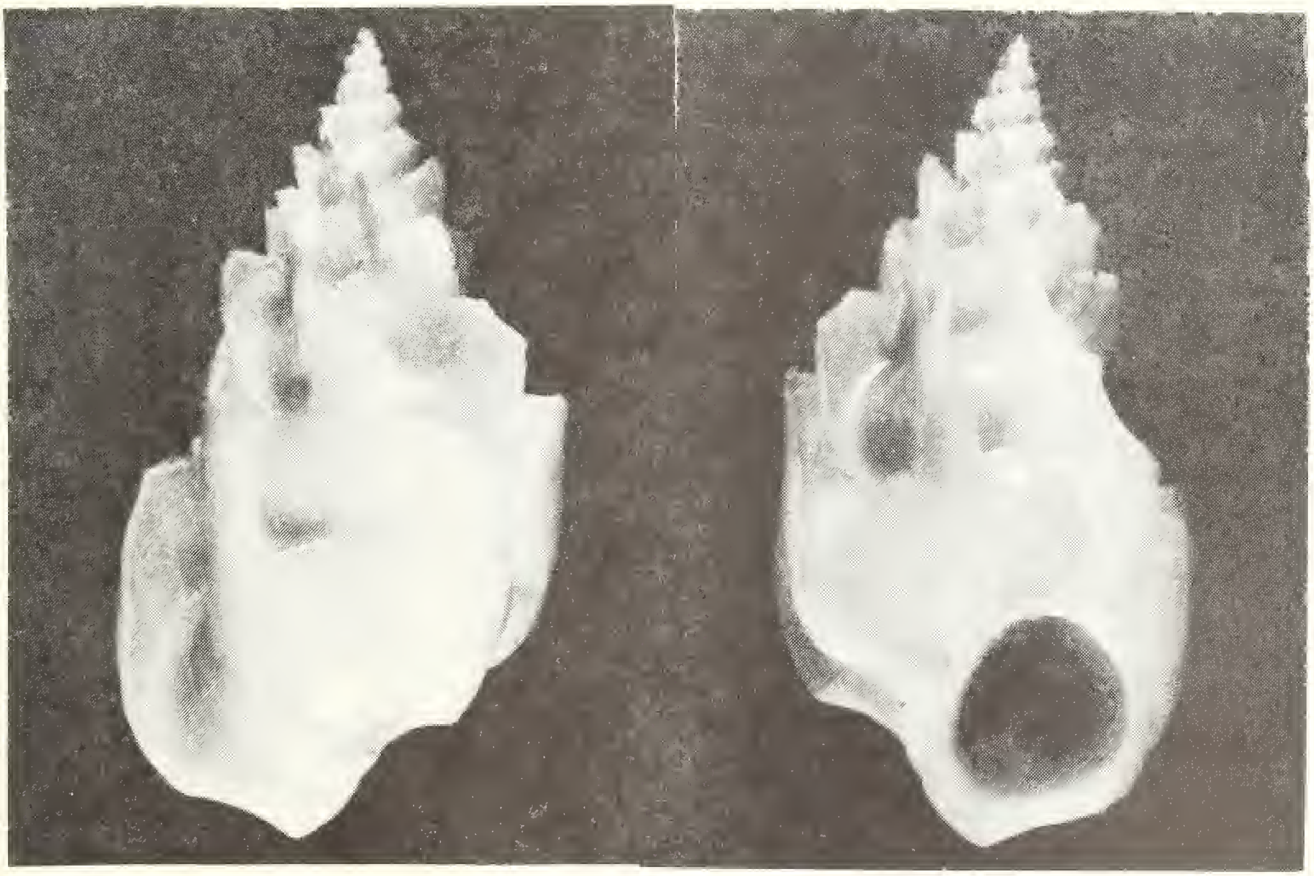

Fig. 5. Two views of *Nitidiscala statuminata* (Sowerby, 1844) 11mm L x 7mm W Farfan Beach, Panama Bay, Panama, night tide (-0.9ft.), at sides of rocks.

GEOGRAPHICAL DISTRIBUTION

Twenty-nine species of epitoniids, including species of *Amaea* and *Opalia*, are known from the Bay of Panama. The fauna contains many wide ranging species, some of which are known from only a few specimens. Four species, *Nitidiscala skoglundae* DuShane, 1974, *N. columella*, *N. tabogense*, and *Asperiscala zeteki* all of Dall (1917), exhibit endemism within Panama Bay. One species, *Gyroscala lamellosa* (Lamarck, 1822), is worldwide in distribution. Another, *Asperiscala billeeana* (DuShane & Bratcher, 1965), seems to have an analog at the Maldive Islands in the Indian Ocean and according to Robertson & Schutt (1984) is also collected in Singapore, the Philippines and Hawaii, where it lives on the same red coral, *Tubastrea aurea* (Quoy & Gaimard, 1824). *Opalia diadema* (Sowerby, 1832), symbiotic with sea anemones and taken live only at the Galápagos Islands, has a distribution south to Peru. One small, dead specimen was taken at Farfan Beach. Two species, from deep water, were obtained from commercial fishermen, *Sthenorytis dianae* (Hinds, 1844) from Panama Bay with no depth data, and *Amaea (Scalina) tehuanarum* DuShane & McLean, 1968 from off Cape Mala in from 140 to 256 meters.

The papers by Clench & Turner (1950, 1951, 1952) allow one to compare the western Atlantic fauna with that of the Panamic. When compared with DuShane (1974) there seem to be no cognate species of epitoniids on either side of Panama. Those species in the Caribbean are apparently unique to that area as are the epitoniids from the Panama Bay area.

CONCLUSION

The rich intertidal fauna of Panama Bay yielded many species, some of which are known only from dredging in deep water. Of the 70 recognized species of Panamic Epitoniidae, 29 have been collected by me in Panama Bay. There seem to be no cognate species of the family Epitoniidae on the Caribbean side of Panama. A study of the actiniarian species is badly needed since no definitive ecological material can be presented without it.

ACKNOWLEDGMENTS

Credit must be given to Richard Callaway, James H. McLean, and Donald Shasky who assisted in many ways to further the collecting efforts and/or made information available relative to the study. I am indebted to the Smithsonian Tropical Research Institute, Canal Zone, Panama for water temperature records during the months collections were made. My special appreciation is given Dr. A. Myra Keen (Professor Emerita, Stanford University) for her helpful guidance and to David K. Mulliner for the beautiful photographs of the epitoniids figured in this paper.

LITERATURE CITED

ADAMS, C.B.

1852. Catalogue of shells collected at Panama with notes on synonymy, station and habitat. Ann Lyceum. Nat. Hist. 5:229-548. New York.

BRUSCA, R.C.

1973. Common intertidal invertebrates of the Gulf of California. U. of Ariz. Press. 427 pp., many text figs. Tucson, Arizona.

CARPENTER, P.P.

1856. Description of new species of shells collected by Mr. T. Bridges in the Bay of Panama and its vicinity, in the collection of Hugh Cuming. Proc. Zool. Soc. London, part 24:159-166.

CLENCH, W.J. & R.D. TURNER

1950. The genera *Sthenorytis, Cirsotrema,*...in the western Atlantic. Johnsonia 2(29):221-248, pls. 96-107.

1951. The genus *Epitonium* in the western Atlantic (Part I). Johnsonia 2(30): 249-288, pls. 108-130.

1952. The genera *Epitonium, Depressiscala*...in the western Atlantic (Part II) Johsonia 2(31):289-386, pls. 131-177.

DALL, W.H.
1917. Notes on the shells of the genus *Epitonium* and its allies of the Pacific coasts of America. Proc. USNM 53(2217):471-488.
DUSHANE, H.
1967. *Epitonium (Asperiscala) billeeana* (DuShane & Bratcher, 1965) non *Scalina billeeana* DuShane & Bratcher, 1965. Veliger 10(1):87-88.
1974. The Panamic-Galapagan Epitoniidae. Veliger (Suppl. 16):79-84, 154 photos, 1 map, 5 figs.
__________& T. BRATCHER
1965. A new *Scalina* from the Gulf of California. Veliger 8(2):160-161, pl. 24.
__________& J.H. MCLEAN
1968. Three new epitoniid gastropods from the Panamic province. Contrib. in Sci. Los Angeles County Mus. Nat. Hist. 145:1-6, 6 figs.
PERRAN, F.
1978. The habitat and feeding behavior of the wentletrap *Epitonium greenlandicum*. Malacologia 17(1):63-71, 1 fig., 1 table. (French & Russian summaries).
QUOY, J.R.C. & J.P. GAIMARD
1824 [-1826]. Voyage autour du monde...sur...l'Uranie et la Physicienne par L. de Freycinet [in] Zoologie 3, vii+712 pp. Paris.
ROBERTSON R. & P.L. SCHUTT
1984. Golden wentletraps on golden corals. Hawaiian Shell News 32(11):1,4, 3 color photos.
SEBENS, K.P. & R.T. PAINE
1978. Biogeography of anthozoans along the west coast of South America: habitat, disturbance, and prey availability. Symp. on marine biogeog. & ecol. in south. hemisphere. N.Z. D.S.I.R. Publ. 134.
SOWERBY, G.B. 2ND.
1844. Descriptions of new species of *Scalaria*, collected by Hugh Cuming, Esq. Proc. Zool Soc. London 12:1-38.
STRONG, A.M. & L.G. HERTLEIN
1939. Marine mollusks from Panama collected by the Allan Hancock Expedition to the Galápagos Islands, 1931-32. Allan Hancock Foundation Publ. Univ. S. California Press 2(12):177-245, pls. 18-23.
VERRILL, A.E.
1869. Review of the corals and polyps of the west coast of America. Trans. Conn. Acad. Arts Sci. 1(2), no. 6:377-558, pls. 4-10.
ZETEK, J.
1918. Los moluscos de la Republica de Panama. Revista Nueva 5(2/6):509-575, (also published separately, 69pp.).

ILLUSTRATED NATURAL HISTORY BOOKS:

AN ACCOUNT OF THE PRODUCTION OF PRE-INDUSTRIAL AGE WORKS

BY

ANTHONY D'ATTILIO

Department of Marine Invertebrates, San Diego Natural History Museum, Balboa Park, P.O. Box 1390, San Diego, California 92112

A good deal of the present day work in systematics is still dependent on original illustrations and descriptive texts for primary research purposes. Although nomenclatural binomens in zoology had their inception in Linnaeus' 10th edition of the SYSTEMA NATURAE (1758); works a century earlier than this date were used by Linnaeus as reference works. Since many actual specimens were not available to him, he referred to figures as early as 1681 in RICREATIONE DELL' OCCHIO E DELLA MENTE NELL' OSSERVATION' DELLE CHIOCCIOLE of Buonanni.

Before the technological age, books or scientific papers were done by long established techniques. Before the invention of the type mold by Gutenberg in ± 1440 which made printing from movable type practical for the first time, books were entirely "Illuminated Manuscripts" in which the text and illustrations were painted by hand. The techniques of wood block printing was also known but the block was painted with an ink coated roller which touched only the raised, uncut area of the block. A sheet of paper, properly prepared was placed over the ink smeared block and an impression was made on the paper in the hand worked press. (This method had been known for many centuries in China before it was used in the western world). If color was needed another wood block was used and impressions made in the same manner on the same sheet of paper. Except for the fact that Gutenberg's invention simplified the process, the effect, visually, was the same. The added advantage of Gutenberg's movable press was that more copies could be obtained relatively cheaply from the wood blocks. This process then was the first to make all books more easily available to the educated classes of the time.

When more elaborate color shadings and different colors were required, the additional coloring was done by hand by trained craftsmen. Because the wood block was limited for very fine detailed work, the etching or engraving of metal plates or blocks came into use. By means of very fine cross-hatching and/or similar techniques, the engraved plate, when coated with ink, made a much finer, closer detailed study of the subject possible. Coloring the black and white paper after inking was still done by hand entirely, and this process continued into the early 19th century.

Stone lithography became a highly developed process at the end of the 18th and beginning of the 19th century and this process made possible extremely elaborate (or simple) illustrations because the process permitted gradations of black. The CONCHOLOGIA ICONICA of Reeve and other such large series of volumes were done entirely in this manner with the coloring still done manually.

A great improvement, requiring no manual work except the preparation of the lithographic stone blocks, was achieved by making different blocks for each separate color. The shading was made possible by daubing the block with spots close together for darkness and more distantly placed for lightness. Tbe paper was then subjected to three or four pressings.

In all of the methods of hand or mechanical printing explained above, the work was done by more than one person. An artist made an original sketch in black and white or color; the wood, metal, or lithographic block was prepared by a second craftsman; and the final stage of hand coloring was done by artistically trained persons who had to repeat the same finished effect on an edition of 200 to 300 or more. One can imagine that if a number of craftsmen were employed on a single large work continuing over a number of years, the finished work might have

drifted far from the original drawing or painting of the artist. Frequently, when looking at the earlier finished book and one done much later, the earlier work is superior. This indicates that the artisan might have become bored with the constant repetition. Close supervision was necessary by the artist to assure the continued quality of his work.

The malacologists who use these old books must bear in mind that no two books of the same title look precisely alike, either in the drawing or the coloring. An outstanding example of poorly supervised work is in the plates from the CONCHYLIEN CABINET by Martini and Cbemnitz and in Perry's CONCHOLOGY, OR THE NATURAL HISTORY OF SHELLS. The effect in the volumes of the CONCHYLIEN CABINET is especially bad, in some instances, because the descriptions in no manner match the figures. Some malacological workers have disregarded these figures and relied entirely on the texts. However, the ICZN has ruled that this large (10 volume) work is not available for nomenclatural purposes. Strangely though, Chemnitz did describe one species following the binomial form of Linnaeus which he published separately from the CONCHYLIEN CABINET. This is the famous *Conus gloriamaris*.

CLUB NEWS

FROM THE MINUTES - SAN DIEGO SHELL CLUB MEETING - 20 JUNE 1985

Paul Scott, of the Santa Barbara Museum of Natural History, was the speaker for the evening. His talk "Hunting Mollusks in the Beaufort Sea" was both informative and amusing. He had taken beautiful slides of the desolate region north of Alaska which he found to have a unique beauty. He showed us the "sea" and the "beaches" in this white on white place and illustrated the considerable effort involved in just getting to the "beach" to take the grab samples of the molluscan fauna. Bivalves were the predominant mollusks collected in the grab samples and he highlighted his talk with pictures of some of those collected.

As an added attraction, Paul showed slides he had taken while preparing, along with others, for the transfer of the S. Stillman Berry mollusk and book collection from the Berry home in Redlands to the Santa Barbara Museum of Natural History. He showed slides of Dr. Berry's home, garden, and the mountains of shell lots everywhere inside the house. These slides and Paul's narrative were an additional and unexpected pleasure.

The turnout was small and it was decided to dispense with the usual business meeting. Several announcements were made, however. The Club needs a garden location for the September party. A Caribbean theme has been selected and preferred dates are either Saturday September 14th or 21st. If you would we willing to "lend" your garden for the party, please contact a board member. Wally Robertson announced that he will be ordering Shell desk diaries. Contact him if you would like him to order one for you. He also said that the new cowry book is enroute.

SHELL EXHIBIT OPENING AT THE SAN DIEGO MUSEUM OF NATURAL HISTORY

On Friday evening June 21, the wine and cheese reception celebrating the opening of the exhibit, "Rare, Rediscovered and Newly Described Marine Mollusks" was hosted by the Malacology Department and its Acting Chairman, Anthony D'Attilio. The close to fifty friends and lovers of shells who attended the opening were enchanted by the beauty of the shells on display and the elegance of the exhibit. For those who missed the opening, the exhibit will be on display, adjacent to the Sefton Hall of Shore Ecology, for an indefinite period of time.

BOOK NEWS

LIBRARY DONATION

A copy of SPIRALS OF THE SEA by Safer & Gill (1982) has been donated to the Club library by June King. It is the Club's good fortune to have friends like June who give their generous support to the Club and its library.

ALSO RECEIVED FOR THE CLUB LIBRARY

Genus *Clypeomorus* Jousseaume (Cerithiidae: Prosobranchia. by Richard S. Houbrick, 1985, Smithsonian Contributions to Zoology no. 403, Smithsonian Inst. Press, Washington, D.C., 131 pages, 61 figures

The tribe Alasmidontini (Unionidae: Anodontinae), Part II: *Lasmigona* and *Simpsonaias*, by Arthur H. Clarke, 1985, Smithsonian Contributions in Zoology no. 399, Smithsonian Inst. Press, Washington, D.C., 75 pages, 22 figures

A NEW PUBLICATION ON LATIAXIS

Received from the Institute of Malacology,Tokyo, Japan is the announcement of a new book, ILLUSTRATED CATALOGUE OF LATIAXIS AND ITS RELATED GROUPS by Dr. Sadao Kosuge with 24 color plates and 24 black and white plates and over 200 species briefly described and discussed. A prepublication price of $12.00 U.S. plus postage is offered. A special offer for clubs ordering 10 books will be a free book and a reduction in postage from $4 to $3 per book (or $30. per 10 copies). A sample plate and order form will be available at the July meeting for those interested.

NEW MEMBERS

Arden, George J., 122 E.38th St., New York, NY 10016
Kabat, Alan R., Museum of Comparative Zoology, Harvard University, Cambridge MA 02138
Wuyts, Jean, Koningarendlaan 82 2100 Deurne, Antwerp 22, Belgium

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Address all correspondence to the San Diego Shell Club, Inc., c/o 3883 Mt. Blackburn Ave., San Diego, CA 92111

Single copies of this issue: $5.00. Postage is additional.

Meeting date: third Thursday, 7:30 P.M. Room 104, Casa Del Prado, Balboa Park

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PROGRAM

"A Trip To Antarctica "

Jay Shrake of Marine Ecological Consultants, will give an illustrated presentation, with a shell display, on his trip to Elephant Island in the Antarctic via research vessel from the South African coast to Antarctica.

Meeting date: August 15, 1985

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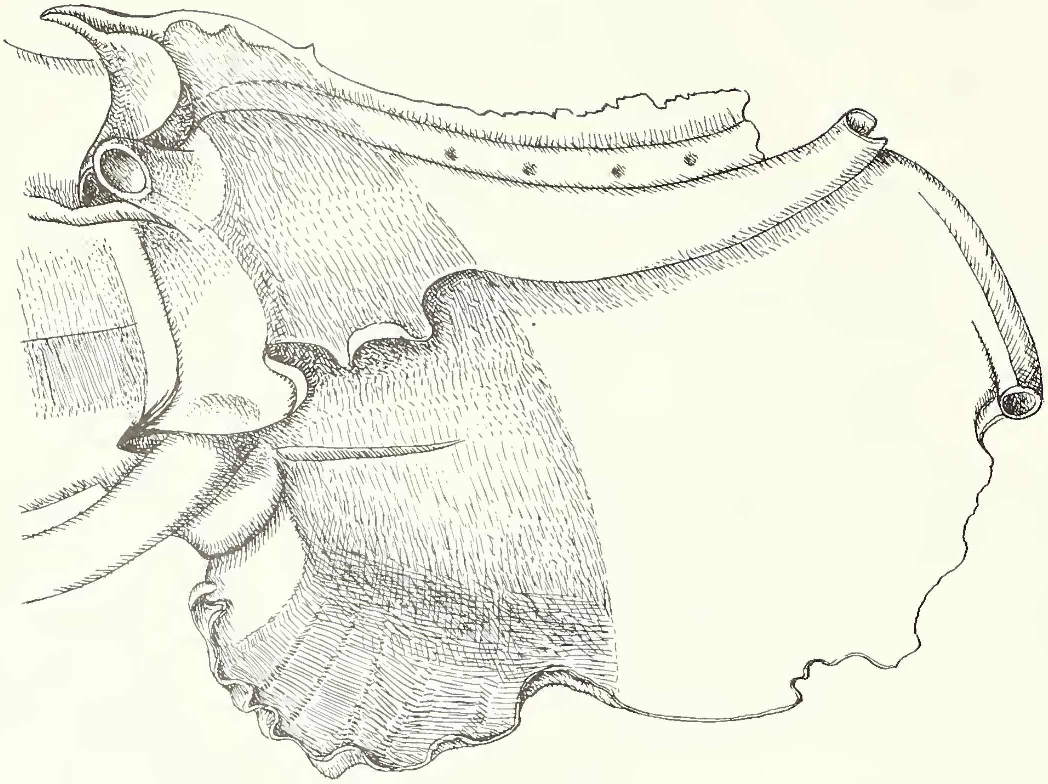

Fig. 2. Detail drawing of dorsal view of specimen shown in Figure 1.

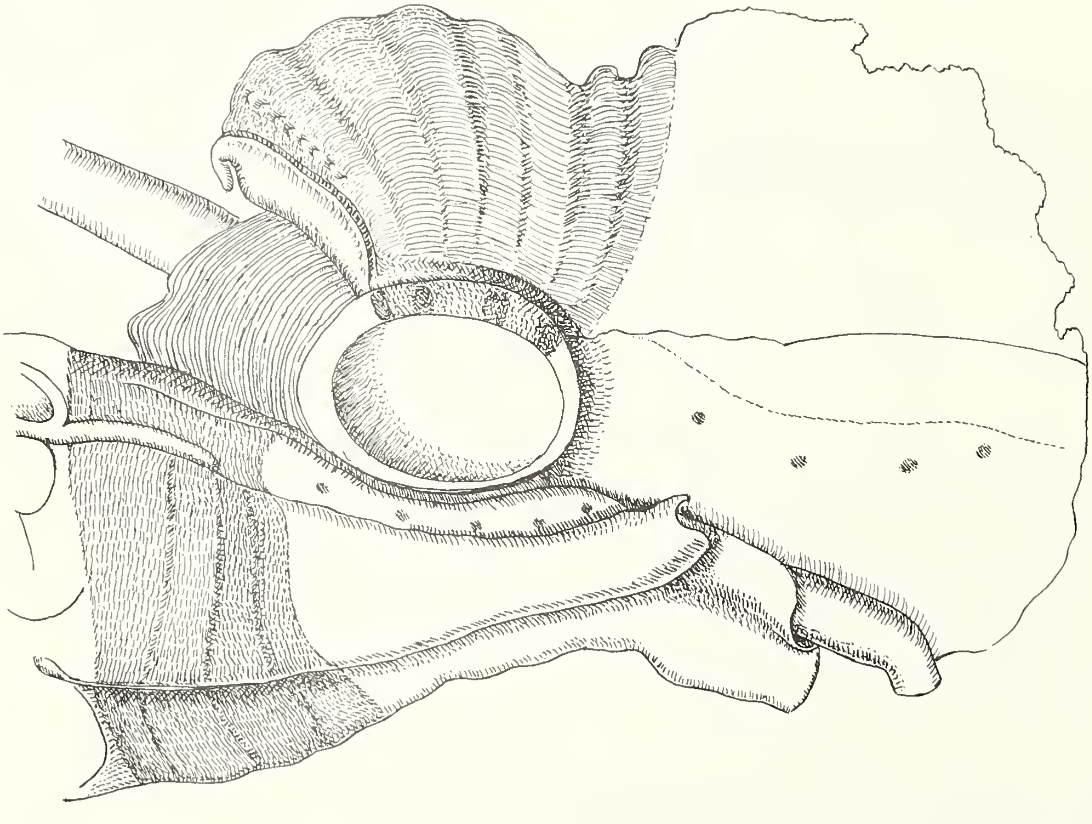

Fig. 1. Camera lucida drawing of detail of apertural view of *Typhisopsis occlusum* Garrard, 1963

COMMENTS ON TYPHISOPSIS OCCLUSUM GARRARD, 1963 FROM THE PHILIPPINE ISLANDS

BY

ANTHONY D'ATTILIO

Department of Marine Invertebrates, San Diego Natural History Museum, Balboa Park, P.O. Box 1390, San Diego, California 92112

The specimen detailed here from camera lucida drawings in Figures 1 and 2 was sent to me for examination by Bob Foster of Santa Barbara. It is 36 mm in height with an extraordinarily long (23 mm) spine tube [= ?anal tube]. The six whorls have a shoulder that is angled and the area above the angle is depressed between the four tubes. As in many typhine genera, the flange extends above the shoulder and is folded into a spine. The remaining flange extends to the whorl above and the tube abuts the flange which acts as a support or buttress for the tube*.

The apertural varix on the body whorl is exceptionally broad and is especially so towards the closed siphonal canal which, when viewed dorsally, appears to adhere to the flange. Instead of a narrow band of brown encircling the body whorl (as in the type from Hayman Island, Whitsunday Passage, Australia, shown here in Figure 3 from Garrard 1963), the Philippine shell has a broad chocolate brown band extending from the shoulder to the middle of the body whorl. The shell is otherwise mostly white. The brown band extends onto the broad apertural rim and there are four light colored spots, evenly spaced, on the aperture. Four dark brown spots are regularly spaced below the aperture on the white area. A specimen of this figure from the Philippines was well figured by Lopez & Zambo (1979) reproduced here in Figure 4.

Fig. 3 *T. occlusum*, holotype from Garrard (1963)

Fig. 4. *T. occlusum*, from Lopez & Zambo (1979)

LITERATURE CITED

GARRARD, T.A. 1963. New species of Mollusca from eastern Australia. J. Malac. Soc. Austral. 7:42-46, pl. 7, figs. 9 & 10.

LOPEZ, AL & E. ZAMBO. 1979. It's supertyphis! Hawaiian Shell News (August) p.3.

* Note: Garrard (1963) in his original description of *T. occlusum* substitutes the term foramen for the anal tube or shoulder spine tube. The term has otherwise never been used in typhine literature to my knowledge and does not seem justified since the dictionary meaning of foramen is of a small opening, perforation, or orifice.

BOOK NEWS

BY

CAROLE M. HERTZ

KAWAMURA COLLECTION WORLD SEASHELLS OF RARITY AND BEAUTY
1983. Published by National Science Museum, Tokyo, softbound
Text and figure legends in Japanese with plate explanations in Japanese and English
Price: $12.00

This 8½" x 11" softcovered booklet has 48 colored plates highlighting specimens from the famous Kawamura collection. The species illustrated are photographed life size and the quality of both the shells and the photography is superb. An English introduction by Dr. Takashi Okutani (on a separate sheet included with the errata), gives some background on Mr. Kawamura and his collection which was donated to the National Science Museum in Tokyo. Other than the plate legends and the introduction, there is no text.

This booklet is in no way designed for the scientist, but rather for the collector and/or appreciator who might enjoy browsing through the beautiful photographs of shells which comprise a part of the Kawamura collection.

RED SEA SHELLS
By Doreen Sharabati
Photography by Issam A. Sharabati
1984. Rutledge and Kegan Paul, London
128 pages, 49 color plates, softbound
Price $12.00

Prepared by the same husband and wife team that produced SAUDI ARABIAN SEASHELLS (Festivus 17(6):65), this book is designed as an identification guide to shells of the Red Sea, an area long in need of such a book. The 49 color plates illustrating over 450 Red Sea species are top rate and for all but a few of the small gastropods i.e. *Terebra affinis* (plate 33, #13) and nondescript, small bivalves such as some on plate 48, the photographs would serve well for identification. The use of numbered outline diagrams for plate references, however, can prove more than a bit frustrating.

The plates and the accompanying text are not arranged systematically. Notes on each family and scientific name, size of photographed specimen and habitat information is provided for each species (unless identified only to the genus level). Mrs. Sharabati has enlisted the help of friends and specialists both for collecting and identification of the mollusks and preparation of the text. Solene Morris, of the British Museum of Natural History, wrote the bivalve section and Nathalie Yanow did the section on opisthobranchs including some of the photography of the live animals, the only group in which live animals are featured.

The material includes the, by now almost obligatory sections on collecting, cleaning, classifying, and cataloguing shells as well as a glossary, index to common names, bibliography and index. A chapter on Zones of the Sea and a brief discussion, with map, of the Red Sea area (still omitting Israel) are interesting and informative. Tbe combination of the very fine photography and modest price make this book a worthwhile purchase for those interested in worldwide mollusks and their relationship to the shells of the Red Sea area.

CANCELLARIA COOPERI OFF SAN ONOFRE, CALIFORNIA

BY

RICHARD HERRMANN

7711 Eads Avenue, La Jolla, California 92037

The specimen of *Cancellaria cooperi* Gabb, 1865 shown in Figure 1 is one of two collected by divers doing research off the San Onofre Generating Station between 1982 and 1985. Both specimens were juveniles with mature lip and protoconch intact (Figure 2). The shell in Figure 1, which was collected by me is 26.5 mm long, 15.0 mm at its greatest diameter, and has a protoconch of 2 3/4 whorls and five post-nuclear whorls. It was found on a mud-silt substrate in 52 feet of water. The other animal, of similar size, was found in 100 feet of water, also on a mud-silt substrate along with *Megasurcula carpenteriana* (Gabb, 1865) which is abundant in this area.

McLean (1978) in MARINE SHELLS OF SOUTHERN CALIFORNIA, considers *Cancellaria cooperi* as "uncommon on offshore, sandy bottoms, occasionally found by divers but more often dredged." He gives the range as Monterey, California to San Benito Island in Central Baja California, Mexico.

Jay Shrake, malacologist for Marine Ecological Consultants in Encinitas, California, reports large numbers of *Cancellaria cooperi* on rocky reef substrate through video observations from submersibles in 250 to 300 feet of water. These observations were made during a survey in the Molino Gasfield off Gaviota, California

I thank David K. Mulliner for photographing the *Cancellaria* and Anthony D'Attilio for drawing its protoconch.

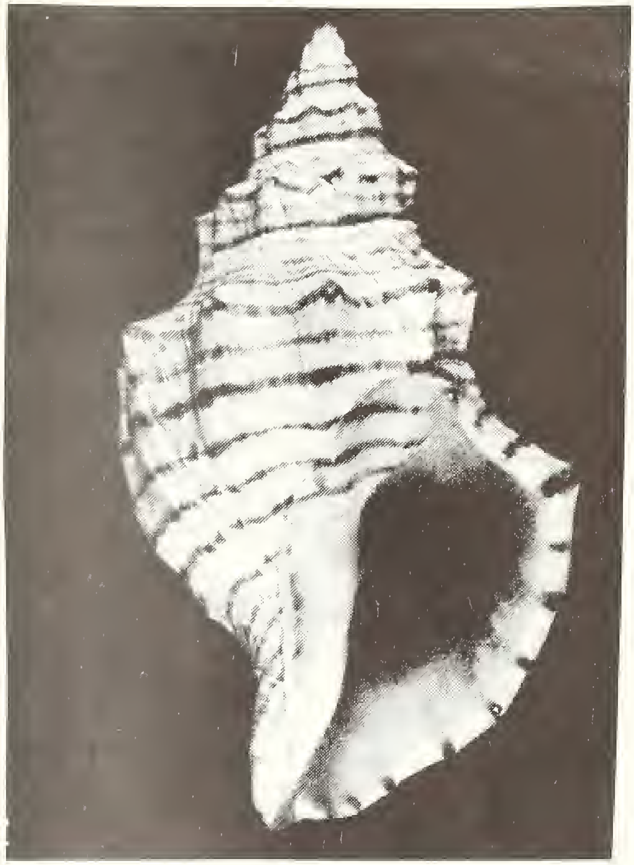

Fig. 1. *Cancellaria cooperi* Gabb, 1865

Fig. 2. Drawing of protoconch of shell of *C. cooperi* shown in Figure 1, at 19X

CLUB NEWS

FROM THE MINUTES - SAN DIEGO SHELL CLUB MEETING - 18 JULY 1985

Our speaker for the evening was Ron McPeak, member, senior biologist for Kelco, and "Best of Show" photographer at the 1985 Del Mar Fair. In April of this year, Ron and several other Club members made a repeat trip to Escondido Bay on the Gulf side of the Baja Peninsula. He shared with us their experiences on this trip--diving, dredging and collecting. Ron talks with professional ease of the various invertebrate species he photographs and his quiet sense of humor adds liveliness to his lectures. His photographs, and those of other members on this trip, were prize winning. How else could I say it? Ron is a popular speaker and always attracts a crowd.

Business Meeting: Frank and Harriet King have offered their home in Vista for the September party. It will be held Saturday, September 21st beginning at 6:00 P.M. The theme will be Caribbean and President Marty Schuler has asked for a volunteer to coordinate the menu.

Billee Dilworth will represent our Club at the AMU meeting in July.

Orders were taken by Margaret Mulliner for the new *Latiaxis* book. Contact Margaret if you were not at the meeting and would like to order a copy.

Barbara Myers, Secretary

COME TO THE SEPTEMBER PARTY

The Club's annual September party will be held on Saturday, September 21st at the home of Harriet and Frank King. (A map will be included with the September issue). The theme will be Caribbean--Island food, music, dress, and entertainment! A signup sheet for food contributions will be available at the August meeting. As is customary, a set menu is planned to fit the theme (Marty Schuler is still looking for a volunteer to coordinate the menu).

The September parties are always great fun, so plan to attend.

NEW MEMBERS

Barton, George & Paula, 620 S. Nevada St., Oceanside, CA 92054 722-7281

Buck, Larry, 2407 Sacada Circle, Rancho La Costa, CA 92008, 436-8265

Zanarini, Bart R., 851 S. Entrada Dr., Fort Myers, FL 33907

The Festivus welcomes all contributions which further the understanding of mollusks. Both popular and scientific articles are actively solicited. At this time The Festivus does not publish descriptions of new taxa.

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Meeting date: third Thursday, 7:30 P.M. Room 104, Casa Del Prado, Balboa Park

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COME TO AN EVENING IN THE CARIBBEAN

The annual September party will be held on Saturday September 21st at the home of Harriet and Frank King. For details see page 95 and map on the last page.

There will be no regular meeting this month.

CONTENTS

The Festivus welcomes all contributions which further the understanding of mollusks. Both popular and scientific articles are actively solicited. At this time The Festivus does not publish descriptions of new taxa.

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OBSERVATIONS ON GROWTH IN CYMATIUM (GELAGNA) SUCCINCTUM (LINNE, 1771) (=TRITON CLANDESTINUM LAMARCK, 1816) AND CYMATIUM FEMORALE (LINNE, 1758) (GASTROPODA: CYMATIIDAE)

BY

ANTHONY D'ATTILIO and BARBARA W. MYERS

Department of Marine Invertebrates, San Diego Natural History Museum, Balboa Park, P.O. Box 1390, San Diego, California 92112

A specimen of *Cymatium (Gelagna) succinctum* (Linne, 1771) was brought to our attention recently by Mr. Robert Yin of La Jolla, California. This specimen, (Figures 1 & 2) measuring 87.5 mm L by 41.6 mm W from the Philippine Islands, is distinguished by possessing two varices plus the apertural varix.

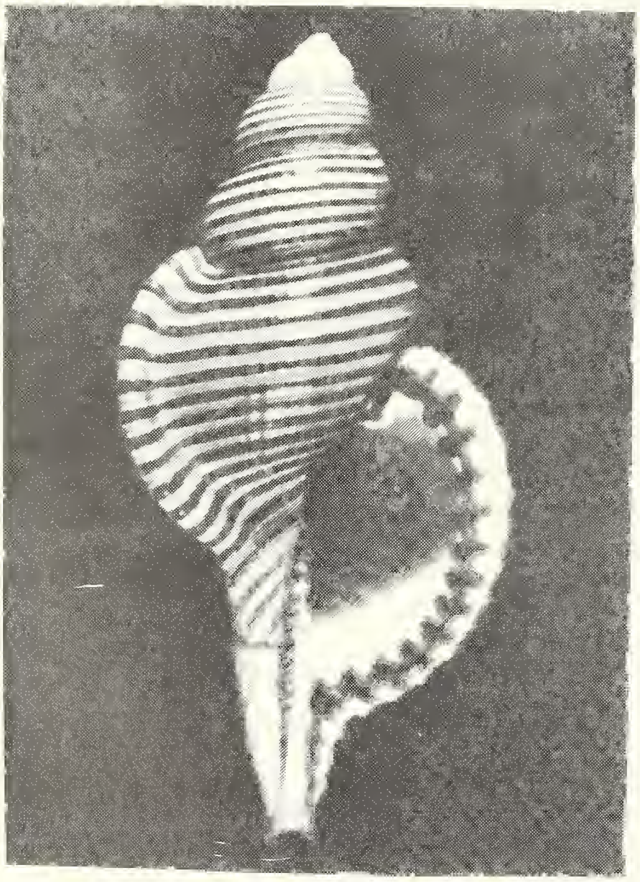


Figure 1. *Cymatium (Gelagna) succinctum* (Linne, 1771), apertural view, from the Philippine Islands showing the two varices plus the labial varix. Size: 87.5 x 41.6 mm.

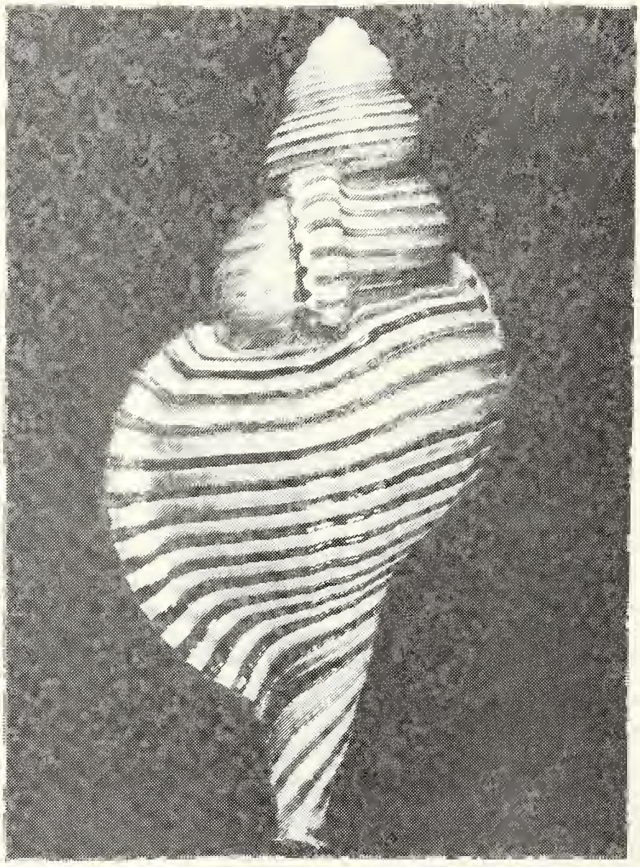


Figure 2. Dorsal view of the specimen shown in Figure 1.

This evidence of varical growth in this species is quite rare. In all the illustrations from Buonanni (1684), Chemnitz (1795), Lamarck (1816), Kiener (1843), Tryon (1881), etc., only Kiener's figure (1843: 7(3):35 *Triton* pl. 11, fig. 2) showed a varix opposite the outer lip (Figure 3). Dodge (1957) remarked, of this varix figured by Kiener, that he had never observed a varix on any specimen and

had not seen a varix on any other figure or mentioned in any description of this species. The normal appearance of *C.(G) succinctum* shows no varices (Figures 4 & 5).

Dodge (1957) reviewed the interesting nomenclatural history of this species. Described by Linne in 1771 as *Murex succinctus*, his name remained practically unknown or unrecognized for years. *Murex succinctus* was described in the Mantissa plantarum...regni animalis appendix p. 551 and not in the Systema Naturae (1758) and this may have accounted somewhat for its obscurity. The species was known by the name *Murex clandestinus*, a Chemnitz (1795) name validated by Lamarck in 1816. Hanley (1855) reported it in the Linnaean collection as *M. succinctus*. The name *M. succinctus* was still not in common use in 1957 when Dodge reviewed the Linnaean species. Abbott & Dance (1982) use the name *Gelagna succincta* with *clandestina* in synonymy. *Gelagna* was proposed by Schaufuss in 1869 with the type *C. (G.) clandestinum* = *M. succinctum*.

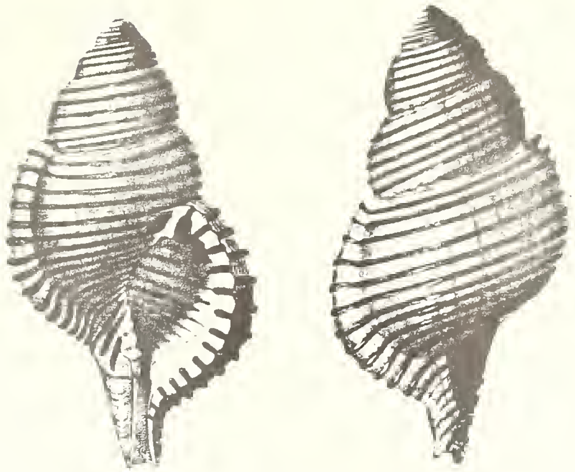


Fig. 3. *C. (G.) succinctum* taken from Kiener (1843) showing the labial varix and a varix opposite the aperture.

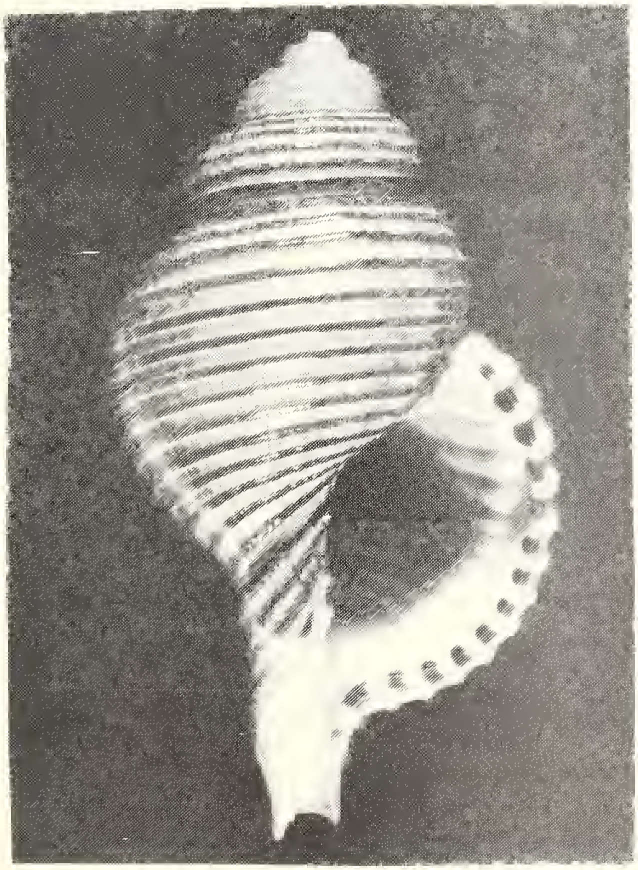


Fig. 4. *C. (G.) succinctum*, apertural view of a specimen from the Philippine Islands. Size: 51.3 x 28.2 mm.

Fig. 5. Dorsal view of the specimen shown in Figure 4.

The unusual specimen of *Cymatium (Gelagna) succintum* shown in Figures 1 & 2 has seven whorls and the first varix appears on the sixth whorl. The second varix is on the body whorl opposite the apertural varix, the growth on this specimen being approximately 240° between each varix. Evidence of episodic growth is confirmed by Mr. Charles Glass of Santa Barbara, California who has two specimens of *C. (G.) succinctum* (66.5 and 71.7 mm) in his collection with more than just the apertural varix. Interestingly, Mr. Donald Pisor of San Diego, California has two specimens of this species (63 and 64 mm) with only the apertural varix. Cross (1967) figured a live *C. (G.) succinctum* and the specimen appears to have a second varix opposite the labial varix although no mention is made of a second varix.

In a recent paper, Linsley & Javidpour (1980) reviewed the various methods of episodic growth in several families of gastropods including Cymatiidae. In examining thin sections of shell from various varix-bearing gastropods, they found that shell growth in these gastropods is not the result of a constant process of accretion: instead it is an abrupt episode of growth. They state that in all species of Cymatiidae they examined, the distance between varices (and thus the major growth episodes) extend 240° ±15° of a shell's circumference or 2/3 of a volution. This differs from the Muricidae, for example, in which episodic growth usually forms varices every 1/3 or 1/6 of a volution. In studying *Cymatium raderi* D'Attilio & Myers, 1984 and *C. femorale* Linne, 1758, we found this 240° growth stretch to be consistent. Linsley & Javidpour (1980) also describe a curious method of growth for *Cymatium echo* (Kuroda & Habe, 1950) that we had observed in *C. femorale*. We obtained a series of nine specimens of *C. femorale* from Mr. L.J. Bibbey of Imperial Beach, California, in various stages of varical growth. *C. femorale* has only a single varix on the body whorl preceding the thickened outer lip. The periostracum in this species is soft and fibrous, of a tan color, and has numerous short flexible bristles. One specimen had the periostracum only, which was soft and flexible with little or no calcareous material adhering to the inside, for the entire 240° growth stretch (that is from the existing labial varix to what would be the new outer lip). A second specimen had a thin layer of calcareous material laid down on the inside of the entire periostracal layer. This had somewhat stiffened the periostracum and made it brittle. Other specimens showed repeated calcareous layers until in the final specimen the growth stretch was hard and equal in substance to the rest of the shell and had formed a thickened outer lip.

Laxton (1970) in studying the growth pattern of *Monoplex australasiae* Perry, 1811, found that as an adult this species usually has only a single labial varix and that this varix may be formed between the third and sixth whorl of the teleoconch. However, he also found that in a small number of older specimens, a second varix may be present. He studied thirteen species of cymatiids, but *M. australasiae* was the only species showing this method of growth. This parallels the growth pattern for *Cymatium (Gelagna) succinctum*.

ACKNOWLEDGMENTS

We wish to thank Mr. Robert Yin for lending us the fine specimen of *Cymatium (G.) succinctum* illustrated and Mr. L.J. Bibbey for the loan of the series of *C. femorale* specimens and further for donating a large specimen in the first stages of abrupt growth (SDNHM 85437). We are grateful to Mr. David K. Mulliner for his photographs of *C.(G.) succinctum* and to Mr. Charles Glass and Mr. Donald Pisor for information on their specimens of *C.(G.) succinctum*. Dr. A.G. Beu of the New Zealand Geological Survey read the paper.

LITERATURE CITED

ABBOTT, R.T. & S.P. DANCE
1982. COMPENDIUM OF SEASHELLS. N.Y., 411 pp., 4200 figs.

BUONANNI, F.
1681. Ricreatione dell' occhio e della mente nell' osservation' delle chiocciole. Rome.

CHEMNITZ, J.H.
1795. Neues systematisches Conchylien-Cabinet. Nuremberg. Band 11.

CROSS, E.R.
1967. A living *Cymatium clandestinum*. Hawaiian Shell News 15(4):1.

D'ATTILIO, A. & B.W. MYERS
1984. A new western Atlantic species of *Cymatium* (Gastropoda: Cymatiidae). Nautilus 98(1):31-36, 12 figs.

DODGE, H.
1957. A historical review of the mollusks of Linnaeus. Pt. 5. The genus *Murex* of the class Gastropoda. Bull. Am. Mus. Nat. Hist. 113(2):77-224.

HANLEY, S.
1855. Ipsa Linnaei conchylia. The shells of Linnaeus determined from his manuscript and collection. London.

KIENER, L.C.
1843. Species general et iconographie des coquilles vivantes. 7 *Triton*. 48 pp., 18 pls.

LAMARCK, J.B.P.A.
1816. In J.G. Bruguiere, J.B.P.A. Lamarck & G.P. Deshayes. Encyclopedie Methodique. Pt. 23, pls. 391-488. Liste 16 pp.

LAXTON, J.H.
1970. The relationship between the number of varices and total shell length in some New Zealand Cymatiidae and its ecological significance. Veliger 13(2):127-134, 6 figs.

LINNE, C. VON
1758. Systema naturae. Stockholm. 10th ed., vol. 1. 824 pp.
1771. Mantissa plantarum...regni animalis appendix. Stockholm.

LINSLEY, R.M. & M. JAVIDPOUR
1980. Episodic growth in gastropoda. Malacologia 20(1):153-160, 7 figs.

SCHAUFUSS, L.W.
1869 Molluscorum systema et catalogus. Dresden. 119 pp.

TRYON, G.W. Jr.
1881. Manual of Conchology vol. 3. Tritonidae, Fusidae, Buccinidae. Philadelphia. 310 pp., 87 pls.

MUREXIELLA DIOMEDAEA (DALL, 1908), FROM THE GULF OF CALIFORNIA

BY

CAROLE M. HERTZ and ANTHONY D'ATTILIO

Department of Marine Invertebrates, San Diego Natural History Museum, Balboa Park, P.O. Box 1390, San Diego, California 92112

Murexiella diomedaea (Dall, 1908), a species not often seen in collections, was described from 85 fathoms (156 m) in the Gulf of Panama. Until recently, this species was known only from the type locality. In 1970, however, E.H. Vokes reported a specimen in the American Museum of Natural History (AMNH 92435) taken by shrimpers off Cedros Island, Mexico, and Radwin & D'Attilio (1976:157, pl. 25, fig. 1) figured a specimen from off Punta Gorda, Baja California Sur, Mexico. Now, specimens of this intricately sculptured species have been found in the Gulf of California; off Danzante Island in 100 meters by Margaret and David Mulliner (Figures 1 & 2), and off Punta San Antonio, San Carlos Bay, Guaymas, Sonora, Mexico in 100 fathoms (183 m) by Forrest and Leroy Poorman (Figures 3 & 4). In addition, at the recent Western Society of Malacologists meeting, Carol Skoglund said that she and her husband, Paul, had also dredged specimens of *M. diomedaea* off the northeast corner of Danzante Island in 300 to 400 feet (91 - 122 m). They dredged a total of three specimens: a live taken 31 mm specimen in October 1981; and two specimens in October 1983, one 22 mm live taken and one 34 mm dead taken specimen.

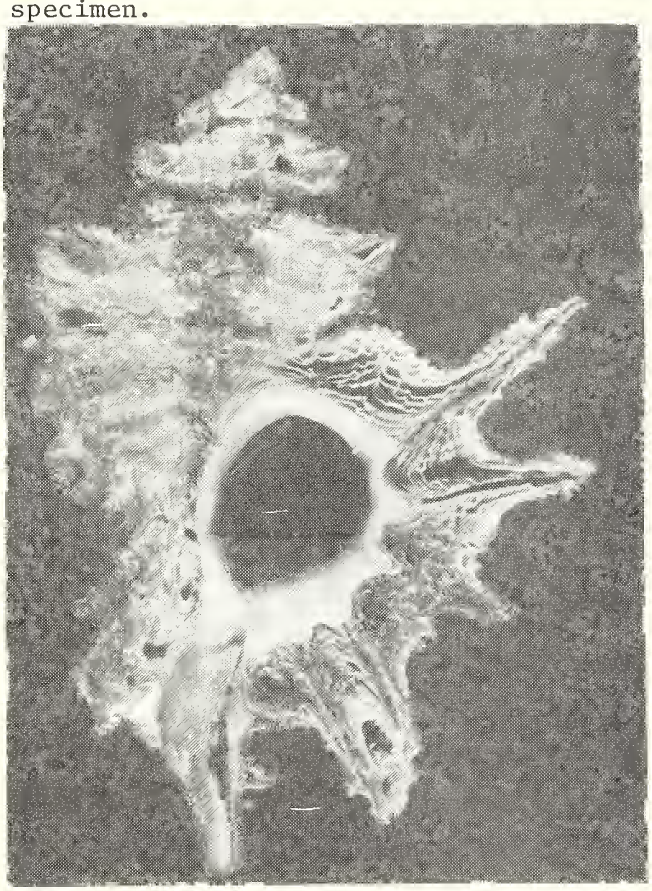


Fig. 1. *M. diomedaea*, apertural view. Dredged, 100 m, in gravel, northeast corner of Danzante Is., Gulf of California Leg: Margaret & David Mulliner, 4 April 1985, Size: 38.5 mm L.

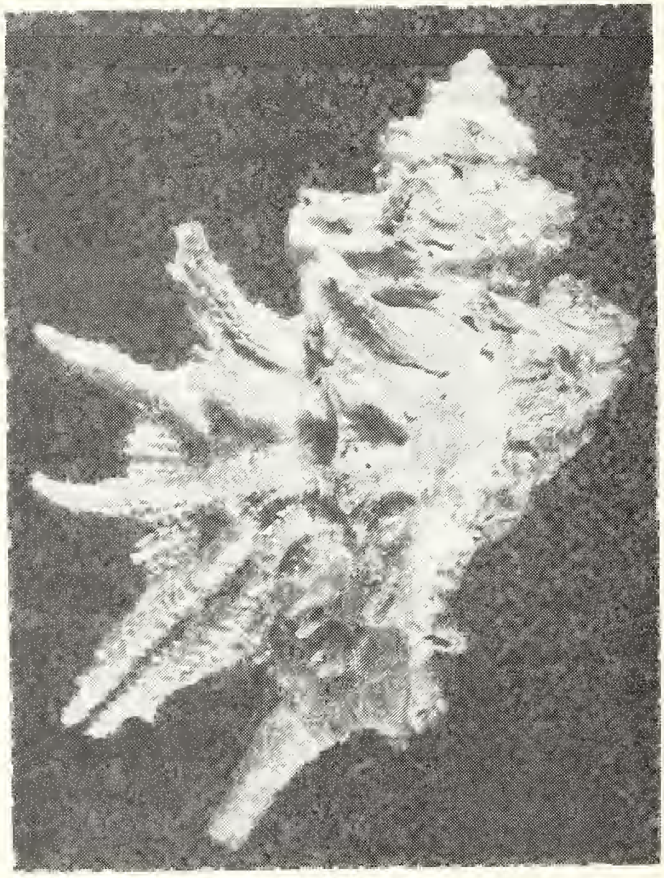


Fig. 2. Dorsal view of specimen shown in Figure 1.

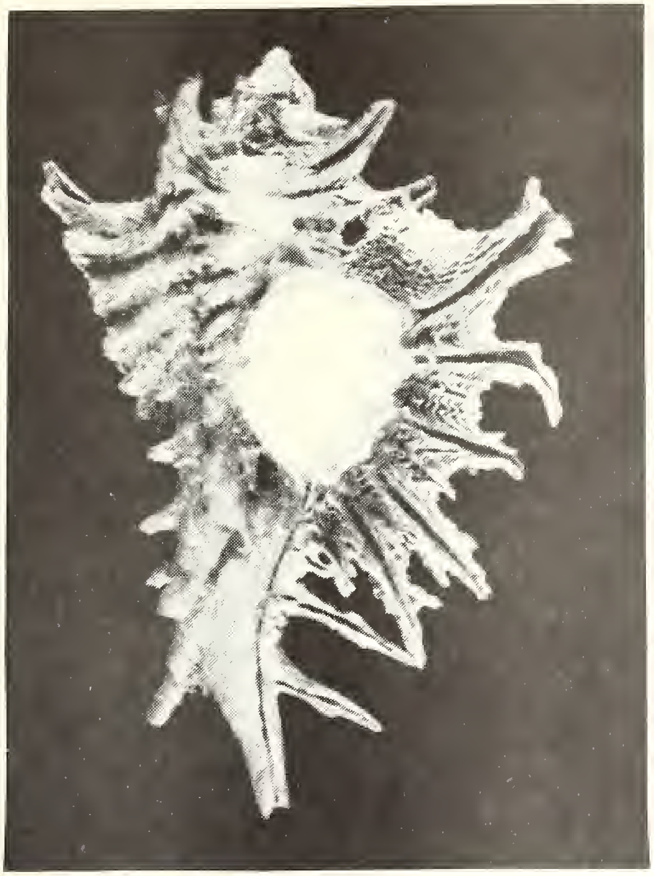


Fig. 3. *M. diomedaea,* apertural view, Dredged 183 m, off Punta San Antonio, Guaymas, Sonora, Mexico
Leg: Forrest & Leroy Poorman, October 1980, Size: 38 mm L, SDNHM 85903.

Fig. 4. Dorsal view of specimen shown in Figure 3.

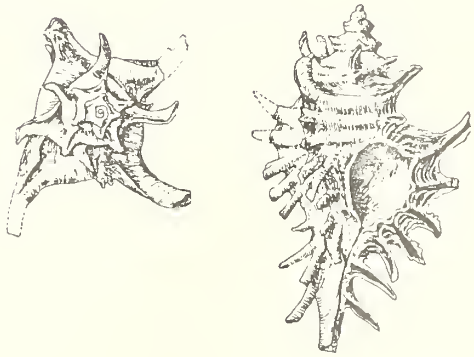


Fig. 5. Two views of the holotype of *M. diomedaea*, from Dall (1908) Gulf of Panama, in mud in 85 fathoms Size: 29 mm L.

Dall's holotype, most likely a juvenile specimen (Figure 5, from Dall 1908, figures 4 & 5), has a 29 mm shell with just over four postnuclear whorls. Dall stated that the shell had "about seven whorls of which nearly three are nuclear and defective." Figures 6a,b are camera lucida drawings of the nepionic whorls of the figured Poorman specimen.

Forrest and Leroy Poorman have collected fifteen specimens of *M. diomedaea*, seven of which were live collected at San Carlos Bay (5 km s.e. of Pta. San Antonio) from May 1977 to November 1983. They made six of these specimens available to us for study, and generously donated the specimen figured here to the San Diego Natural History Museum (SDNHM 85903). The Poorman specimens vary in length from 25 to 42 mm with three specimens having five varices and three having six. (See analysis of Poorman specimens on page).

The Mulliner specimen (38.5 mm L) from Danzante Island (Figures 1&2) was somewhat of a puzzle at first, since the growth break on the body whorl (Figure 2) distorted the outline of the shell by fusing the two anteriormost spines

and giving it the appearance of a gigantic *M. radwini* Emerson & D'Attilio, 1970 (described from the Galapagos Islands) or the Caribbean *M. hidalgoi* (Crosse, 1869). However, when compared with the Poorman specimens which vary from an immature 25 mm specimen resembling the holotype to the mature specimen figured here, the identification of the Mulliner specimen as *M. diomedaea* was confirmed.

Analysis of six specimens of *Murexiella diomedaea* from the Poorman collection.

Specimen size	Number of whorls	Remarks
42 x 30 mm	5	--
41 x 27	5	collected dead, specimen has a relatively higher spire than other 5 specimens
38 x 27	5	SDNHM 85903, donors: F.& L. Poorman
36 x 28	5	specimen has a proportionately larger aperture than other 5 specimens
34 x 28	4	--
25 x 17±	4	

All 6 specimens had 5 rows of spiral cords on body and 2 rows on canal.

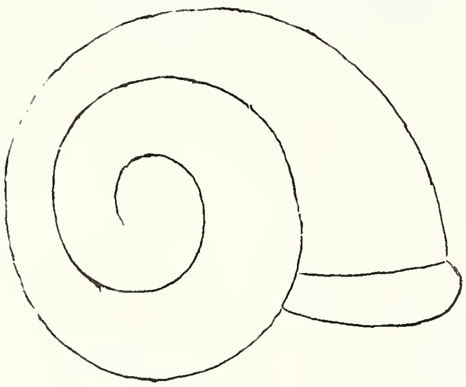


Fig. 6a.

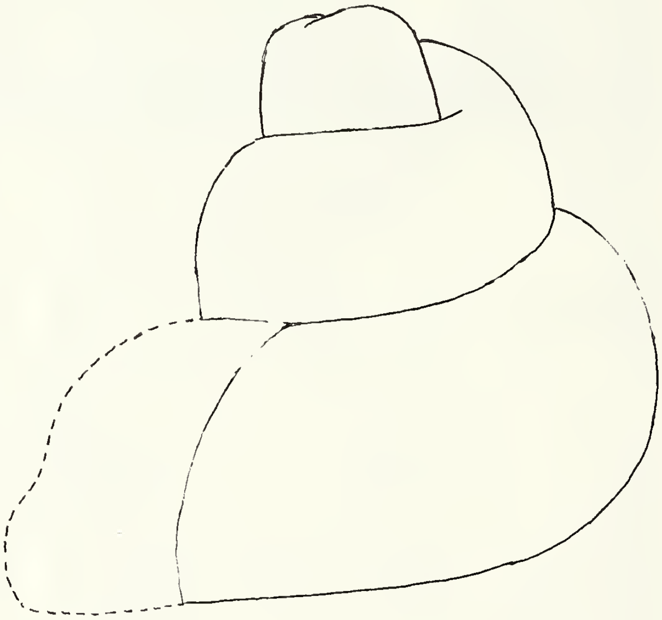


Fig. 6b.

Figure 6a,b. Camera lucida drawings of the protoconch of *M. diomedaea* (SDNHM 85903) showing its 3 whorls. Fig. 6a at 25x (top view) and Fig. 6b at 50x (side view)

The structure of the spines and connecting flanges are as in *Murexiella s.s.* with cords on the receding side of the varices and flanges on the leading side, where the lamellae appear as undulating drapery between the spines. The major spines are grooved along their length. Areas between the spines or cords have 2

or 3 minor cords and also minor cords on the shoulder. The spines are recurved and the shell surface is scabrously lamellate. The aperture is subcircular and large; the anal trough broad and not clearly differentiated. The inner lip is erect and attached only in the area of the anal sulcus. The outer lip is also erect, angulately undulated, and matched with the placement of the spines. The canal is long, narrowly open and very weakly recurved. The older canal terminations are present on the fasciole. The body whorl is large, moderately convex, and the spire is relatively low, with the spiral whorls angulate by reason of the shoulder cords. The color is mostly a dull brown.

ACKNOWLEDGMENTS

We are grateful to Forrest and Leroy Poorman for donating a specimen of *M. diomedaea* to the San Diego Natural History Museum and for the loan of additional study specimens, to Margaret Mulliner for bringing a specimen to our attention, and to Carol Skoglund for additional information on the species. Our thanks to David K. Mulliner for the fine photography of the specimens of *M. diomedaea*.

LITERATURE CITED

CROSSE, H.
1869. Diagnoses molluscorum novorum. J. de Conchyl. 17:408-410.

DALL, W.H.
1908. Reports on the dredging operations of the west coast of Central America to the Galapagos..., The Mollusca and Brachiopoda..., Bull. MCZ Harvard 43(6):205-487, pls. 1-22.

EMERSON, W.K. & A. D'ATTILIO
1970. Three new species of muricacean gastropods from the eastern Pacific. Veliger 12(3):270-274, pls. 39,40.

RADWIN, G.E. & A. D'ATTILIO
1976. MUREX SHELLS OF THE WORLD. Stanford Univ. Press. Stanford, CA,284 pp., 192+ text figs., 32 pls.

VOKES, E.H.
1970. The west American species of *Murexiella* (Gastropoda:Muricidae) including two new species. Veliger 12(3):325-329, pl. 50, figs. 1-10.

AMERICAN MALACOLOGISTS UNION - FIFTY-FIRST ANNUAL MEETING

The fifty-first meeting of the AMU at Rhode Island University, July 29 to August 2nd, was attended by members from all over the world. Residents from fifteen different countries gave papers; these included members from Kenya, Canada, West Germany, Hong Kong, Egypt, China, Finland, Scotland, United Kingdom, Denmark, Venezuela, France, Gambia and India. I also met an old acquaintance from Portugal.

The lecture rooms, at times three being used simultaneously, had a steep stadium-like rise so each viewer had an unobstructed view of the twin screens. In the main lecture room, the screens were about 20 by 16 ft. and in the two other rooms about 8 by 10 ft. The lecture rooms were grouped so a single projectionist could handle the slides for all three programs. At one time there were two sessions on marine and one on fresh water mollusca, making the choice difficult. It sometimes necessitated missing a paper one wished to hear, even though the timing was faultless with different sessions ending exactly on time so that one could switch from one lecture room to another between papers.

In the lobby were large, frequently changed poster displays of molluscan projects. At specified times the author would be by the poster to discuss or explain the project. One I found especially interesting was by Kathryn A. Muldoon entitled, "Molluscs as epifauna on the loggerhead sea turtle." Epifauna from 62 Atlantic loggerheads yielded both sessile and motile molluscs which generally occupied different "habitats" on the turtle. Some were found on the carapace and some in a soft pocket at the rear of the turtle. There were at least eight different species, including one very large murex. The author suspected that the motile mollusca crawled onto the turtle when it was resting on a ledge or on the bottom.

Instead of the usual formal banquet, we enjoyed a New England clambake at the University Bay Campus. Under a canvas top, we were seated at long tables. Instead of cooking in a pit, since the possibility of rain could ruin the whole thing, the cooking was above ground. The lobsters, clams, whole onions, red potatoes, and link sausage were put over the hot coals that were covered with seaweed. The entire thing was covered with about three layers of canvas that was kept damp, adding to the moisture from the seaweed. This was served with delicious fresh corn and watermelon. Instead of rain it turned out to be a delightful evening with a full moon, adding to the perfection of the evening. The clambake concluded a fine meeting.

Billee Dilworth

WESTERN SOCIETY OF MALACOLOGISTS - EIGHTEENTH ANNUAL MEETING

The campus of the University of California at Santa Barbara, located high on a bluff overlooking the Pacific Ocean, was the site of the 18th annual meeting of the WSM, held from August 18th to the 21st. The Santa Barbara Shell Club graciously hosted a get-acquainted wine and cheese reception late on Sunday afternoon and the Malacology Department of the Santa Barbara Museum of Natural History held an open house for WSM members that evening.

Many fine papers were presented during the course of the three day meeting. One, extremely interesting to me, discussed feeding in the herbivorous gastropods *Anachis* and *Bittium*.* Underwater slides of the two gastropods feeding on encrusting algae on *Thalassia* in the Gulf of Mexico were shown and a tape played of the feeding noises of the two species (plus that of a visiting shrimp). The feeding sounds of the two species were quite different (as are their radulae) and easily discerned. Use of microacoustic monitoring enabled the workers to compare foraging frequencies on different foods and evaluate food preferences and abundance

*Kitting, C.L. "Augmented encrusting algal recruitment onto shells of active herbivorous gastropods"

of the preferred foods.

The annual auction of shells and books provided Monday night's entertainment. It was great fun and netted a record total for the WSM student research grants. The banquet, a "Santa Maria Tri-Tip Barbecue" was held in the protected patio adjacent to the dorm. The food was tasty, the portions generous, and the companionship outstanding. Following the dinner, Mr. Bob Hansen of the Nature Conservancy spoke on Santa Cruz Island.

The last day, Wednesday, saw members on field trips to Coal Point for fossils or on "The Spirit" for dredging in the Santa Barbara Channel. It was a very good meeting.

Carole M. Hertz

CLUB NEWS

COME TO AN EVENING IN THE CARIBBEAN

The Club's annual September party, this year with a Caribbean theme, will be held at the home of Harriet and Frank King on September 21st. [See map last page for directions.] There will be Island music, Dave's Port of Spain Punch, Caribbean cuisine, and entertainment including a limbo contest. Festivities begin at 6:00 P.M. So--come in your best Island finery and enjoy!

If you have not been contacted, call Marty Schuler (274-6541), Billee Dilworth (454-5788), or Carole Hertz (277-6259) to arrange for your food contribution.

FROM THE MINUTES - SAN DIEGO SHELL CLUB MEETING - 15 AUGUST 1985

Jay Shrake, of Marine Ecological Consultants, gave an illustrated account of his recent trip to Drake's Passage, which lies between the tip of South America and Antarctica. In particular, he visited Elephant Island situated inside the passage, just north of the Palmer Peninsula. The purpose of the expedition, aboard the Scripps Institution of Oceanography research vessel USS Melville, was to study the life cycle and abundance of krill, a shrimp-like crustacean which is the main food supply of the whales in that part of the world.

He brought a display of several invertebrates, including a few mollusks which had been dredged off Elephant Island from a depth of several hundred meters. He is preparing an account of his experiences in this inhospitable, but starkly beautiful, area and it will be published in The Festivus at a future time.

Richard Herrmann presided over the business meeting in the absence of president Martin Schuler. Arrangements for the September party were discussed. Billee Dilworth won the door prize and also provided, along with host Ian Hamilton, the delicious cookies for the break.

Barbara W. Myers, Secretary

NEW MEMBERS

Sjolie, Linda, 2527 San Diego Avenue, San Diego, CA 92110, 291-0274 (work)

Squires, Richard L., 26800 Espuma Drive, Saugus, CA 91350, (805) 259-0434

CHANGES OF ADDRESS

Adams, Catherine, 13346 Birchwood Drive, Sunnymead, CA 92388

Perrin, Marilyn, 10960 Via Abaca, San Diego, CA 92126, 586-0175

Schuler, Martin, 611 Emerald Avenue, Apt. G, El Cajon, CA 92020, 440-4667

DIRECTIONS

Come to An Evening in the Caribbean!

From I-5
North on I-5 to Hwy 78. Left on Escondido Ave.

From 163
North on 163 to 15 to Escondido to Hwy 78. Right on Escondido Ave.

Escondido Ave. (1+mi) runs right into E. Vista Way. (Hobo Joe's will be directly in front of you). Continue on E. Vista Way for 2.7 mi to Osborne. Left on Osborne for .9 mi. Right on Hutchison. .3mi on Hutchison. Left thru chainlink fence and you're almost there--quite a long driveway!

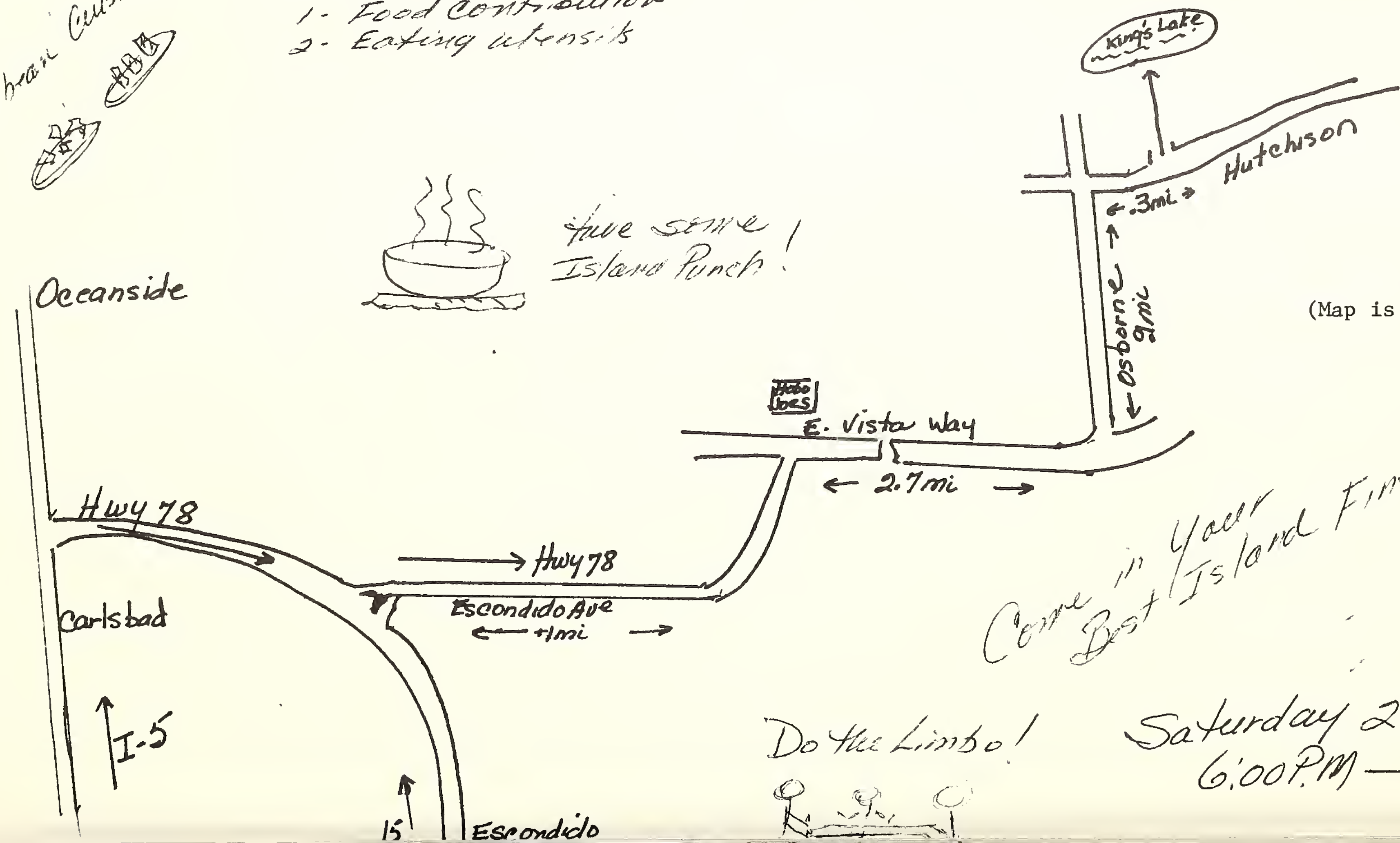
Island Music

Frank & Harriet King
2704 Hutchison
726-2523

Bring ems
1- Food contribution
2- Eating utensils

Caribbean Cuisine

Have some Island Punch!



(Map is not to scale).

Come in your Best Island Finery!

Do the Limbo!

Saturday 21 Sept.
6:00 P.M. — ?

THE FESTIVUS

A publication of the San Diego Shell Club

ISSN: 0738-9388

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MEMBERSHIP AND SUBSCRIPTION

Annual dues are payable to San Diego Shell Club. Single member: $7.00; Family membership: $8.00; Overseas (surface mail): $10.00
Address all correspondence to the San Diego Shell Club, Inc., c/o 3883 Mt. Blackburn Ave., San Diego, CA 92111
Single copies of this issue: $5.00. Postage is additional.
Meeting date: third Thursday, 7:30 P.M. Room 104, Casa Del Prado, Balboa Park

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PROGRAM

A Month in New Zealand - Collecting and Sightseeing

Jules and Carole Hertz will give an illustrated talk on their recent visit to the North and South Islands and will include a display of shells they collected.

Meeting date: 17 October 1985

CONTENTS

The Festivus welcomes all contributions which further the understanding of mollusks. Both popular and scientific articles are actively solicited. At this time The Festivus does not publish descriptions of new taxa.

Publication date: The publication date of The Festivus appears on the masthead above. The Festivus is published monthly except December.

CLUB NEWS

THE ANNUAL SEPTEMBER PARTY

The Evening in the Caribbean was held at the lovely home of Harriet and Frank King on September 21st. It was a mild evening, perfect for an outdoor party with good friends, Dave's punch, and superb Island food. The limbo contest, in unique Club style to the music of Frank King's ukelele, was won by Marty Schuler but enjoyed by all. Our thanks to Harriet and Frank for hosting the party.

MARK YOUR CALENDAR

The Club's Annual Christmas Party will be held on Saturday evening, December 7 at the Mariner Officers' Club in the Destroyer Room. Further details will appear in the November issue.

DUES RAISE FOR 1986

It will soon be time to renew memberships for 1986. The Club approved a raise in the dues to $10.00 for a single membership, $12.00 family, and $12.00 overseas (surface mail).

PUBLICATION RECEIVED

Burgess, C.M., 1985. COWRIES OF THE WORLD, Seacomber Publications, Cape Town, xvi + 289 pages, 20 color plates and numerous color photos.

This long-awaited book is available at last and the Club has already purchased its copy, authorized long ago by the membership. The Club copy will be ready for circulation at the October meeting.

FOR YOUR INFORMATION

THE JOSEPH ROSEWATER FUND

The Joseph Rosewater Fund, in recognition of Dr. Rosewater's many contributions to malacology, has been established at the Smithsonian Institution to give support to students in systematic malacology who wish to work in the Division of Mollusks. Contributions to the Fund should be made payable to the Smithsonian Institution and marked for the Rosewater Fund. Contributions, which are tax deductible, should be mailed to Dr. Clyde Roper, Department of Invertebrate Zoology, Division of Mollusks, Mail Stop 118, National Museum of Natural History, Washington, D.C. 20560.

FROM: A STATUS REPORT ON THE WILLIAM E. OLD, JR. MALACOLOGY FUND, AMNH

Shortly after the death of William E. Old, Jr. in December 1982, the American Museum of Natural History established the Malacology Fund in recognition of Bill's long and devoted service. The Fund now exceeds $14,000 from over 87 individuals and 11 shell clubs and has become a permanent part of the Museum's endowment. Gem specimens of *Conus cervus* and *Cypraea porteri* were purchased with revenue from the Fund. Appreciation is expressed for the generosity shown by Bill's friends and those interested in malacological research. Tax deductible contributions should be made payable to the William E. Old Malacology Fund and sent to the attention of Dr. William K. Emerson, Department of Invertebrates, American Museum of Natural History, Central Park West at 79th St., New York NY 10024.

ADDRESS CORRECTION

Williams, Loralynn, 2226 Montgomery, Cardiff, CA 92007

A NOTE ON LATIAXIS PISORI D'ATTILIO & EMERSON, 1980

BY

ANTHONY D'ATTILIO

Department of Marine Invertebrates, San Diego Natural History Museum, Balboa Park, P.O. Box 1390, San Diego, California 92112

Latiaxis pisori, described from off Mactan Island, Cebu, Philippine Islands, (Figure 1), has been found recently in the Gulf of Aqaba. In fact, a specimen from the Gulf of Aqaba was recently figured (but not identified) in the April 1985 issue of Hawaiian Shell News. This specimen was collected by Shmuel Lavy of Elat, Israel in October 1984 on a night dive in 20 meters of water, deep in dead coral.

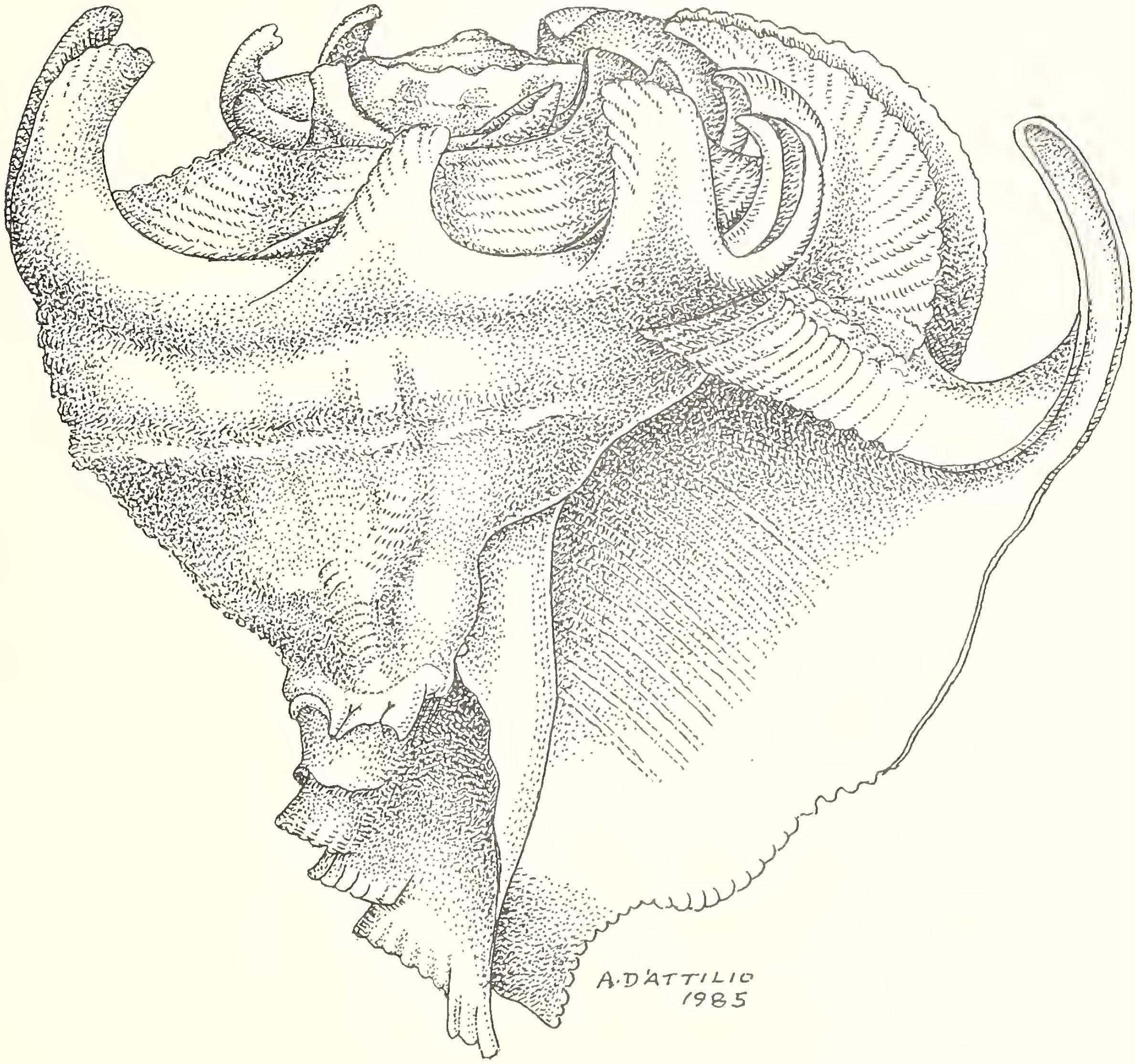

Fig. 1. *L. pisori*, 21.2 mm L (measured from spire) from the central Philippines (?Bohol Straits), shell with peach exterior and violet aperture. Pisor collection.

Mr. Lavy was quoted as stating that, "It is my opinion that the shell is a new one." and "It resembles *Latiaxis mawae* from Japan, but the inside colour is violet and the outside is white tinted with violet. The shell is about 40 mm long." This specimen was later figured by Mienis & Lavy (1985) in the Hawaiian Shell News who stated that they were "most probably dealing with a species recently described from the Philippines and Japan as *Latiaxis pisori* D'Attilio & Emerson, 1980...."

For me, knowledge of this species dates back to the late 1950s when Mr. Akibumi Teramachi sent me two specimens taken at Tosa Bay in southeastern Japan in 40 to 60 meters. At the time these were unidentified and my research, over the years, failed to locate an earlier name. About a decade later specimens of this same species were found by Philippine fishermen using gill nets in about 75 to 100 meters. The Philippine Island specimens were more highly colored and strongly developed in some sculptural features but were undoubtedly conspecific with those received from Mr. Teramachi.

In 1980, Dr. William K. Emerson and I co-authored a paper published in the Bulletin of the Institute of Malacology, Tokyo, describing this new species as *L. pisori* along with another species of *Coralliophila*. *Latiaxis pisori* remains one of the very few species of Coralliophilidae referable correctly to *Latiaxis sensu stricto*, type species by monotypy: *Pyrula mawae* "Gray" Griffith & Pidgeon, 1834.

For a discussion of *Latiaxis s.s.*, see D'Attilio & Bertsch (1979:22-23).

Latiaxis pisori has a coarse, heavy shell, flat topped or tabulate, the degree of

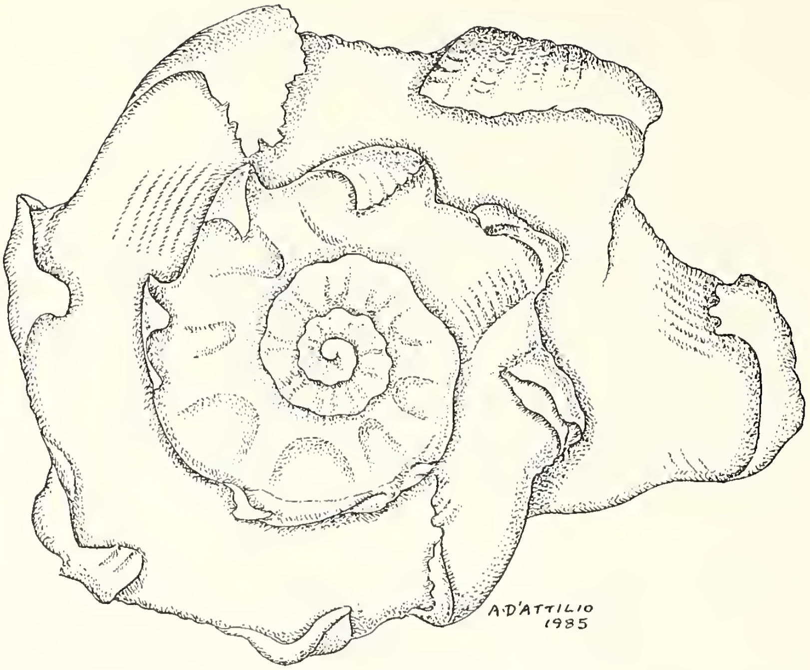

Fig. 2. Detail of spire of specimen illustrated in Figure 1 showing curved in spines, 1½ nuclear whorls, and 3 postnuclear whorls.

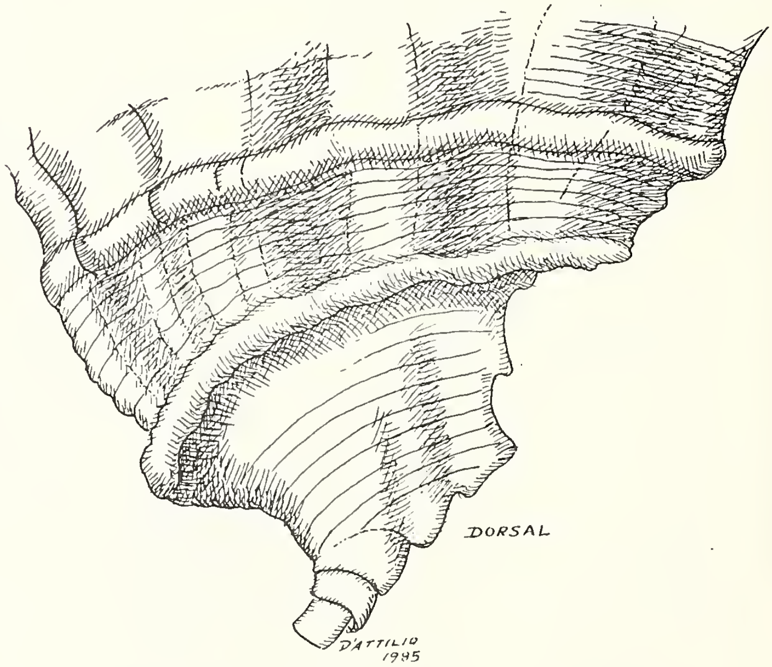

Fig. 3. Detail of dorsum of 30 mm L specimen of *L. pisori* in the Pisor collection. This more mature specimen shows the deeply undercut area below the anterior ridge and the pronounced character of the ridges.

flatness varying among individual specimens (Figure 1). The spines are not very prominent and most often are curved in towards the spire as in *L. mawae* (Figure 2), the last small portion of growth showing the tendency of becoming detached from the body. The axial costae are irregular and the surface sculpture undulating. The strong constriction at the base of the body (Figures 3,4) is significant for this species as is the rough undulating surface of the shell.

In addition to the two recent illustrations of *L. pisori* already noted, it has also been figured by Foster & Glass (1985:5).

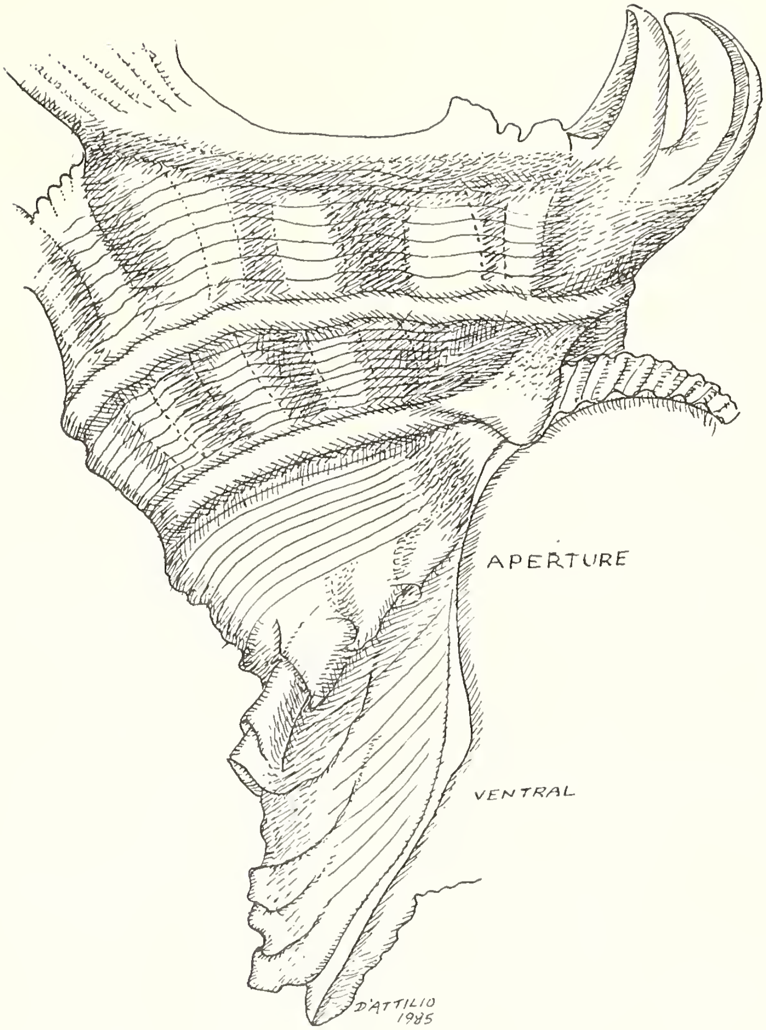

Fig. 4. Detail of *L. pisori*. apertural view of specimen shown in Figure 3. Exterior pale violet, interior of aperture rich violet.

LITERATURE CITED

D'ATTILIO, ANTHONY & HANS BERTSCH
1979. Preliminary account of three generic taxa in the Muricacean family Coralliophilidae. Festivus 11(3):21-25, 6 figs.
___________ & WILLIAM K. EMERSON
1980. Two new Indo-Pacific coralliophilid species (Gastropoda Muricacea). Bull. Inst. Malac. Tokyo 1(5):69-73, pls. 19, 20. (November 30).
FOSTER, ROBERT & CHARLES GLASS
1985. Philippine *Latiaxis*. C.O.A. Bull. 13(1):4-5, 12 figs.
GRIFFITH, EDWARD & EDWARD PIDGEON
1834. The Mollusca and the Radiata arranged by the Baron Cuvier. Whittaker & Co., London. 601 pp., illus.
LILLICO, STUART (Editor)
1985. An off-color *Latiaxis* from Israel. HSN 33(4):6, 1 fig.
MIENIS, HENK & SHMUEL LAVY
1985. *Latiaxis pisori* from the Red Sea. HSN 33(7):6, 2 figs.

PANDORA (CLIDIOPHORA) CORNUTA C.B. ADAMS, 1852, AND NEW INFORMATION ON ITS DISTRIBUTION

BY

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ABSTRACT: *Pandora cornuta* C.B. Adams, 1852, belongs in *Clidiophora* Carpenter, 1864, rather than in *Pandorella* Conrad, 1863. This species, previously reported only from Panama, occurs at San Felipe, near the head of the Gulf of California. A lectotype is chosen for *Pandora (Clidiophora) claviculata* Carpenter, 1856, the type of *Clidiophora*.

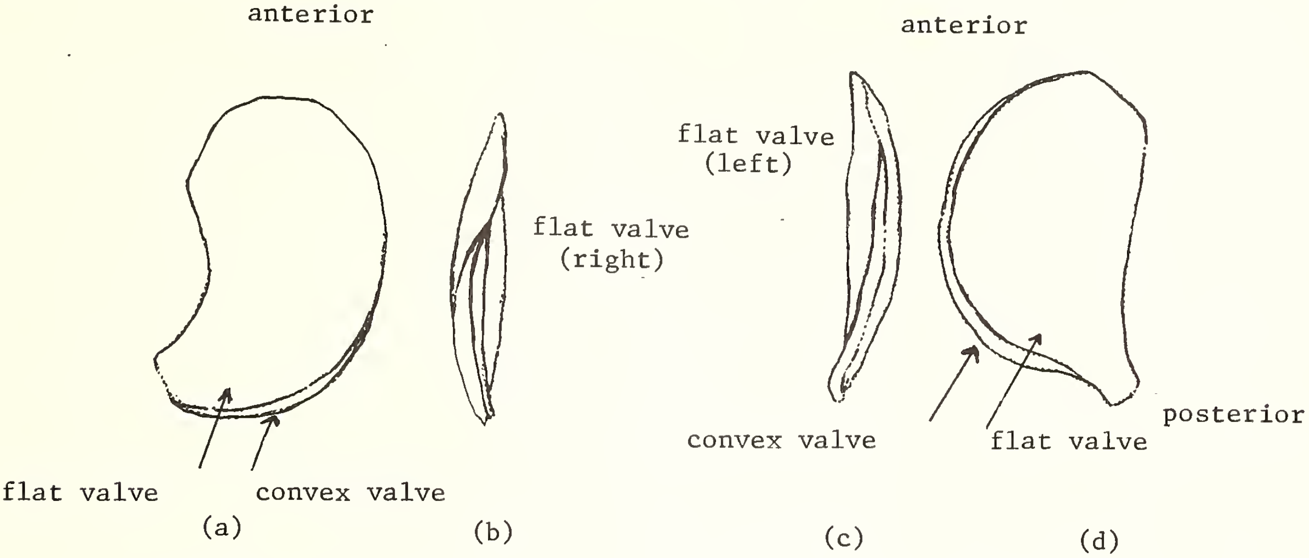
INTRODUCTION: Because there has been confusion concerning the generic placement of *Pandora cornuta* C.B. Adams, 1852, we had difficulty in identifying twelve live-collected specimens of *Pandora* dredged along with seven dead pairs and two valves by Gemmell off Punta Estrella, San Felipe, Baja California Norte, Mexico (Gemmell 1975). They resembled *P. cornuta*, as illustrated in Keen (1971). However, with its geographic distribution supposedly restricted to Panama, its subgeneric classification in *Pandorella* by Keen (1971) and Olsson (1961), and confusion in the description of the dentition of this species by Olsson (1961) and Carpenter (1864), there remained considerable doubt.

In the pandorids the valves are unequal; one valve is flat and the other convex. The flat valve fits into the convex valve, the convex valve curving over the flat valve. The normal position of pandorids is to lie "just below the substratum in a horizontal plane with the siphons showing and with the flat valve uppermost at an angle of less than 40° to the surface" (Allen & Allen 1955). Experiments by Allen & Allen showed that *Pandora inaequivalvis* (Linné, 1767) could lie on either valve though the curved valve underneath was the most usual. They speculated that "tidal movements constantly unbury the animals and may turn them so that they lie with the curved valve uppermost. Those lying in the latter position and those where the mantle touches the substratum will be the quickest to bury and orientate themselves again."

Figure 1 includes outline drawings a-d representing the orientation in *Pandora punctata* and *P.(C.) cornuta*. In orienting the *Pandora* in the traditional manner for most bivalves i.e., the anterior end forward and dorsal margin up with the right valve on the right side and the left valve on the left, most pandorid species examined from the Gulf of California (and represented in Figure 1b by *P. punctata* Conrad, 1837) have the left valve convex and the right valve flat. *P. (C.) cornuta* and *P.(C.) claviculata* (the type of *Clidiophora*) were the exceptions. In these species, the convex valve is on the right and the flatter valve is on the left (Figure 1c).

Most recent authors consider the more convex valve the left valve and the flat valve the right (Morton 1981, Yonge & Morton 1980, Boss 1965); though Allen & Allen (1955) state that the convex valve is the right and the flat valve the left. In our study of the pandorids, we found the assignments of left for convex valve and right for flat valve confusing and actually inaccurate for *P.(C.) cornuta* and *P.(C.) claviculata*. It is easiest to understand the orientation of *Pandora* by placing them in their natural life position resting on the convex valve with the flat valve uppermost as shown in Figure 1a,d, with the convex valve beneath, the anterior end farthest from the viewer and the posterior end closest to the viewer. When examined in this position, both *P.(C.) cornuta* and *P.(C.) claviculata* have

the posterior end curving up toward the right (Figure 1d). All the other Gulf of California species examined (and represented by *P. punctata* in Figure 1a) have the posterior end curving up and facing toward the left. Further studies may show that this difference in orientation is a generic character in *Clidiophora*.



Pandora punctata *Pandora (C.) cornuta*

Fig. 1a-d. Outline drawings of *P. punctata* and *P. cornuta* showing differences in orientation: a&b= *P. punctata*, (a) resting on convex valve (b) traditional orientation; c&d= *P. cornuta*, (c) resting on convex valve (d) traditional orientation.

Gulf of California species of *Pandora* examined are:

Pandora brevifrons Sowerby, 1835 (Gemmell & SDNHM collections)
Pandora cristata Carpenter, 1864 (SDNHM collection)
Pandora punctata Conrad, 1837 (SDNHM collection)
Pandora radiata Sowerby, 1835 (SDNHM collection)
Pandora rhypis Pilsbry & Lowe, 1932 (paratypes SDNHM 27198, 11 specimens)
Pandora uncifera Pilsbry & Lowe, 1932 (paratypes SDNHM 27199, 4 specimens and 2 valves).

We were not able to examine specimens of *Pandora arcuata* Sowerby, 1835, since there are no specimens of this species in the San Diego Natural History Museum collection. We decided not to send for the type because Carpenter (1864:599) stated, "The worn valves in the Cumingian collection [syntypes of *P. arcuata*] do not allow of a confident determination of the genus." Keen (1971:288, #734) figured three syntypic valves of *P. arcuata* from the British Museum (N.H.) which were very worn specimens, two with large holes. The figure by Sowerby in Reeve (1874, pl. 1, sp. 8 *Pandora*) is an interior view of a single valve showing no crura (Figure 2). A ridge

Fig. 2. *P. arcuata* (interior) from Sowerby in Reeve (1874).

is shown anterior to what appears to be the anterior muscle scar. Sowerby (1835) referred to an illustration of *P. arcuata* in Broderip & Sowerby (1830) Species Conchyliorum, Vol. 1, Part II, "Tab. Pand. secund. figg. 27,28." A copy of the *Pandora* section of Volume 1, Part 1, was made available to us from the S. Stillman Berry library by Paul Scott of the Santa Barbara Museum of Natural History. Only Volume 1, Part 1 was in the library with the date 1830 and a note "(all that was published)." Dr. Berry also added, "This was one of the earliest of the pretentious iconographies which appeared in Europe through the next 40 years, but its resplendent plates must have taxed the authors' resources since publication ceased with this slender volume. It is now a work of utmost rarity." William K. Emerson and Walter Sage of the American Museum of Natural History were also unable to locate Part II. Our scientific librarian, Peggy Smith, was unable to locate the publication at the Smithsonian Institution and search of the British Museum (H.H.) holdings showed no Part II. Though the figures 27 and 28 were referred to by Sowerby (1835), Carpenter (1864), Reeve (1874) and Olsson (1961); Sherborn (1922) stated that Volume I, Part I was the only portion ever published.

Palmer (1963:319) advised that Olsson (1961, pl. 81) "thoroughly figured" *P. arcuata*. His drawing of the dentition is shown here in Figure 3. Olsson (1961:456) in his description of *P. arcuata* states, "...left valve moderately convex, the right concavely depressed..." He placed *P. arcuata* in *Clidiophora*; synonymized *P. claviculata* with *P. arcuata* and then cited *P. arcuata* as type of the subgenus. In describing the dentition of the subgenus he stated that "...in the left valve, the anterior lamina is similar to that of the right valve and like it extends nearly or quite to the front of the adductor scar." Olsson's figure and description of the dentition of *P. arcuata* removes it from *Clidiophora* since the anterior lamina in *P. arcuata* is in front of the anterior muscle scar rather than posterior to it as in *P. (Clidiophora) claviculata* and the left valve is convex rather than the right.

Fig. 3. Dentition in *P. arcuata* from Olsson (1961).

The pandorids are usually rounded anteriorly, sometimes rostrate posteriorly. The exterior shell surface is often covered, in part at least, by a periostracum under which is a chalky layer analogous to the intriticalx of some muricids and other gastropods. When abraded, a prismatic or nacreous layer is revealed. The interior shell surface is also nacreous.

The structure of the ligament is considered to be one of the most primitive (Yonge & Morton 1980). The primary ligament is internal, reinforced by a long lithodesma (Morton 1981). In the Pandoracea, a "secondary ligament occupies the pivotal axis and is now responsible for alignment of the edentulous valves" (Yonge & Morton 1980). The pandorids do possess, however, tooth-like elements or crura, which are pairs of diverging ridges often referred to as secondary teeth by Morton (1981) and Yonge & Morton (1980). For a schematic view of the interior of the valves of *Pandora (C.) cornuta*, see Figure 4.

Pandora cornuta has been placed in *Pandorella* Conrad, 1863, and in *Clidiophora* Carpenter, 1864. *Pandorella* is a genus originally described as having no cardinal teeth. Its type species is *Pandora arenosa* Conrad, 1834, from the Miocene of Virginia. Olsson (1961:454) characterized *Pandorella* as "having two crural elements in the right valve but with the resilium heavily reinforced by a lithodesma."

We borrowed the type species of *Clidiophora*, *P. (Clidiophora) claviculata*

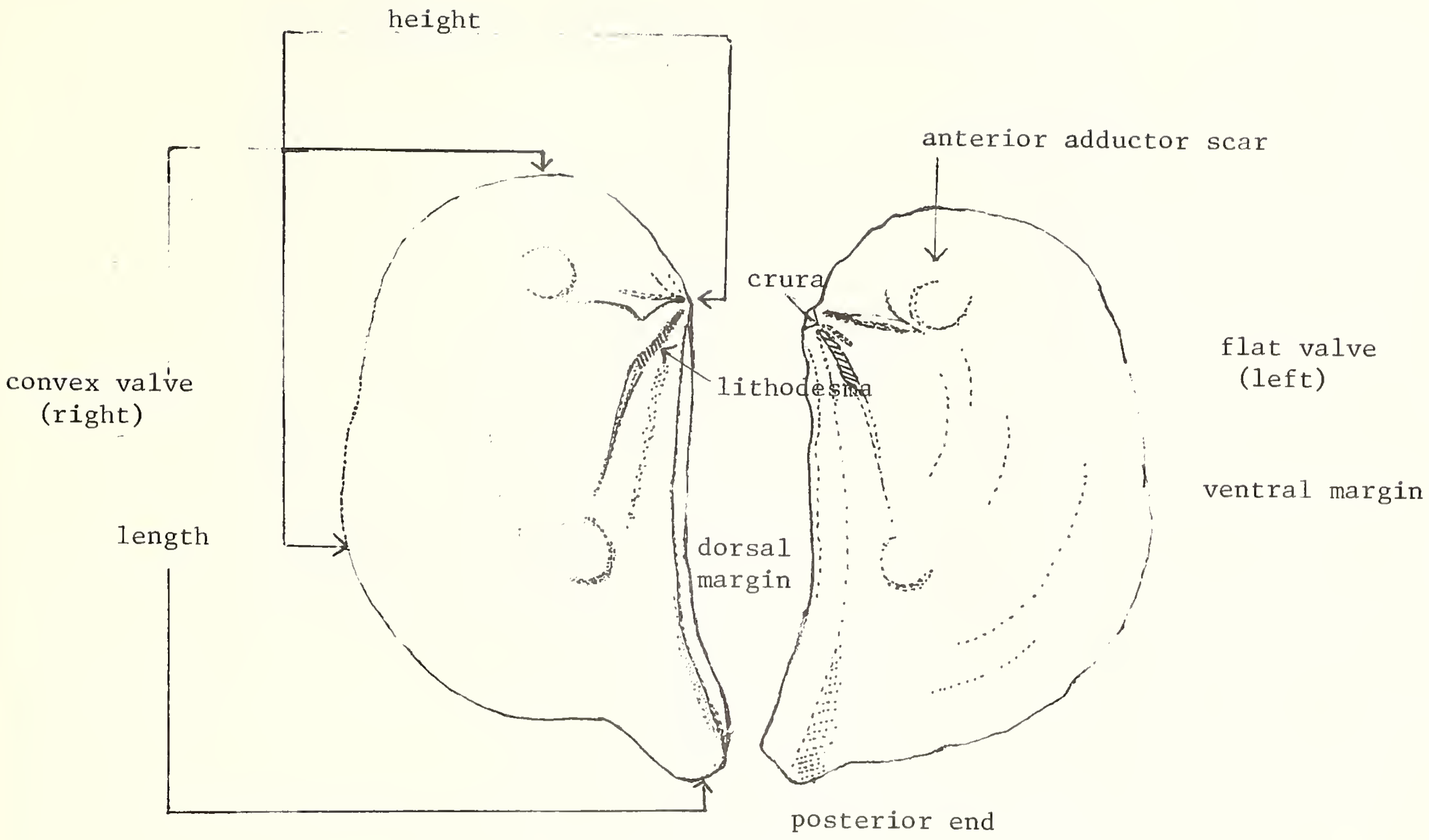


Fig. 4. *P. cornuta*, schematic view of the interior of the valves.

Carpenter, 1855 (type locality Mazatlan), from the British Museum (N.H.). The specimen is the measured syntype BMNH Reg. #1962052/1. We have chosen this specimen as lectotype and figure it here in Figures 5-7. Carpenter's published measurements are "long. 1.23, lat. 1.78, alt. .22 poll." (31.2, 45.2, 5.6 mm). Our measurements are height 34.2, length 45 mm.

Carpenter's description of the dentition in this species (and the subgenus) is confusing because he used the terms "clavicle," "ossicle," and "lamina" to describe the crural elements. Dall's (1903:1517-1518) description of *Clidiophora* is straightforward and easy to follow. It is reprinted here.

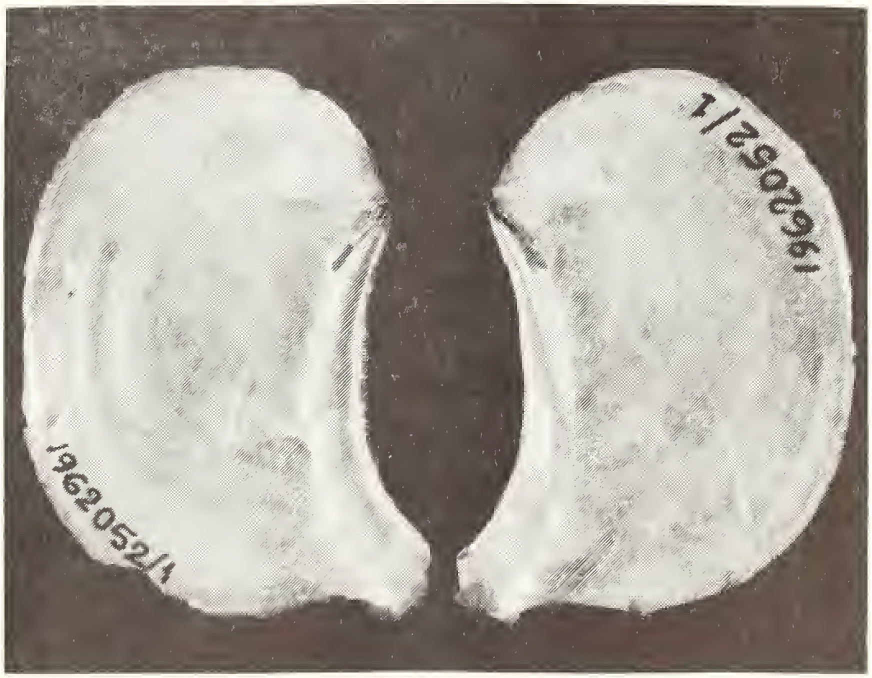


Fig. 5. Lectotype of *P.(C.) claviculata* (interior) BMNH Reg. #1962052/1. Photo published courtesy of Trustees of the British Museum of Natural History.

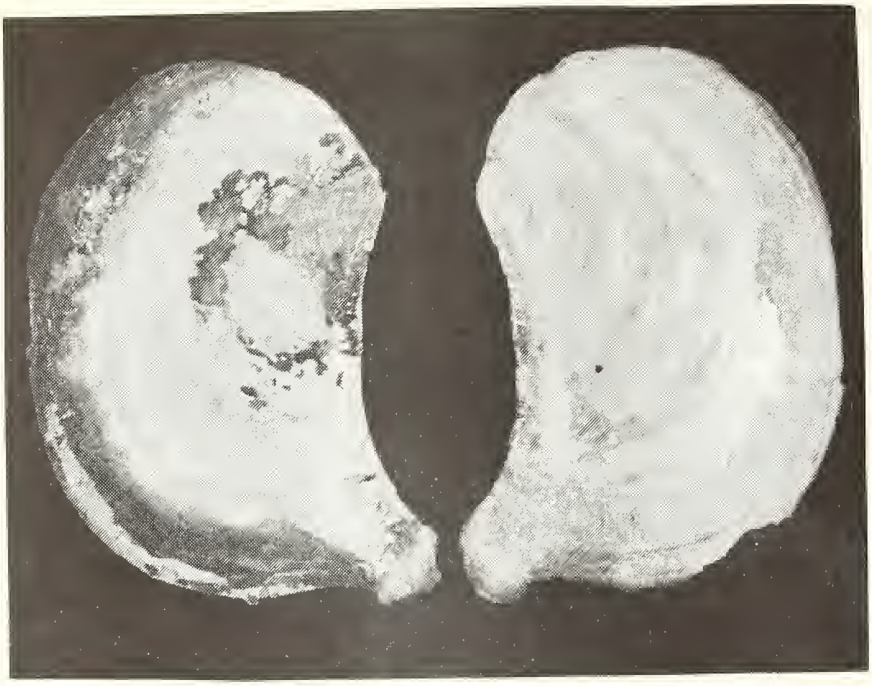


Fig. 6. Exterior of lectotype of *P.(C.) claviculata.*
Photo published courtesy Trustees of the British Museum (N.H).

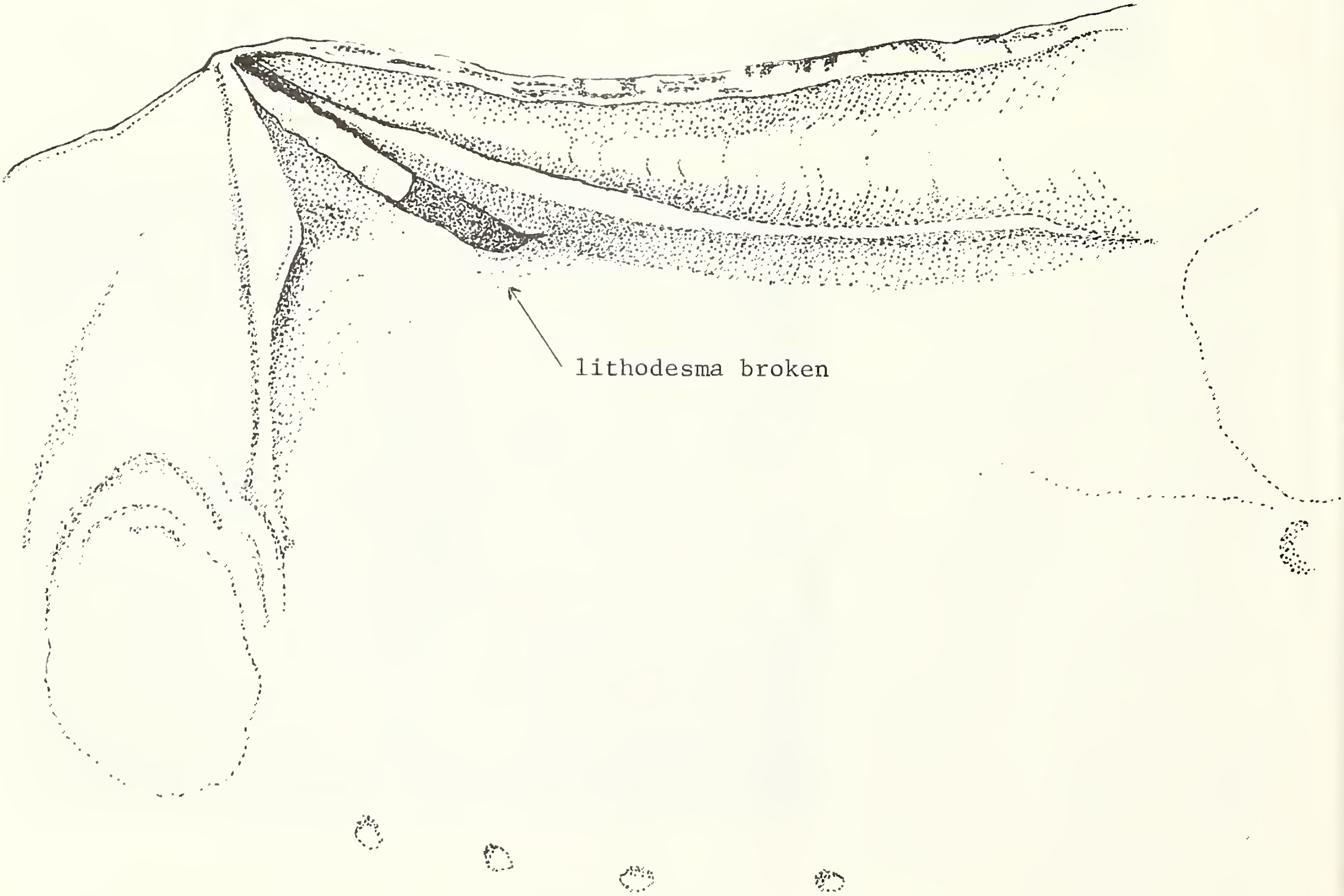


Fig. 7. Camera lucida drawing of dentition of the convex (right) valve of the lectotype of *P.(C.) claviculata.*

Subgenus *Clidiophora* Carpenter. Type *C. claviculata* Carpenter.

Left valve with three laminæ, two in front and one behind the resilium, the anterior ending behind the anterior adductor scar, the posterior much elongated; right valve with a very long posterior lamina, an elevated pedunculate median lamina, and a low, obscure anterior lamina parallel and close to the median; a lithodesma is present.

We also borrowed the holotype of *Pandora cornuta* from the Museum of Comparative Zoology at Harvard University to compare its dentition with the type of *Clidiophora* and with the Gemmell specimens. Figure 8 shows the dentition of the type of *P. cornuta*. The dentition of *P. cornuta* is the same as the type of *Clidiophora*. The holotype of *P. cornuta* (MCZ 186309) was previously figured by Turner (1955, pl. 17, figs. 14, 15), Olsson (1961, pl. 81, figs. 7, 7a), and Keen (1971:288, #734).

Pandora (Clidiophora) cornuta
C.B. Adams, 1852

Pandora cornuta C.B. Adams, 1852
Clidiophora acutedentata Carpenter, 1864, replacement name for *P. cornuta* not validly proposed
Pandora (Clidiophora) cornuta C.B. Adams (Keen 1958)
Pandora (Pandorella) cornuta C.B. Adams (Olsson 1961)
Pandora (Clidiophora) cornuta C.B. Adams (Palmer 1963)
Pandora (Pandorella) cornuta C.B. Adams (Keen 1971)
Pandora (Pandorella) cornuta C.B. Adams (Abbott 1974)
Pandora (Pandorella) cornuta C.B. Adams (Bernard 1983)

DISCUSSION: The twelve live collected Gemmell specimens of *P. (C.) cornuta* (G-482) measure from 24.3 mm length by 15 mm in height to 41.4 mm L by 33.5 mm H. Seven empty pairs and two valves were taken at the same time. One juvenile specimen from seastar stomachs (Gemmell, Hertz, Myers 1980) as well as two specimens (18 mm and 17 mm L) found in shell drift were also collected. Figures 9 and 10 show the interior and exterior of one of the Gemmell specimens of *P. (C.) cornuta*. Figure 11 is a detail of the hinge and muscle scar of the specimen shown in Figures 9 and 10.

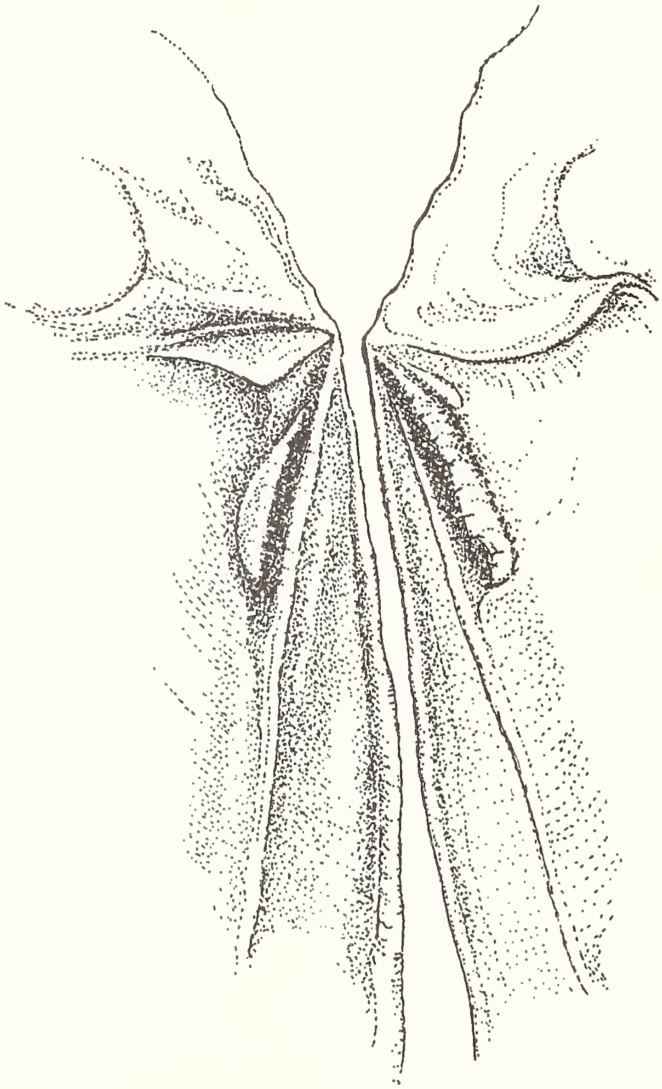


Fig. 8. *P. cornuta*, holotype (MCZ 186309). Camera lucida drawing of dentition of both valves at 12X.

In the types of *P. (C.) claviculata* and *P. (C.) cornuta*, as well as the Gemmell specimens of *P. (C.) cornuta*, the anterior crural element falls just posterior to the anterior muscle scar. This is a consistent feature (Figures 5,7,8,10). It is apparent that the Gemmell specimens are conspecific with *P. (C.) cornuta*.

While the dentition in *P. (C.) cornuta* and *P. (C.) claviculata* appear the same, we observed differences based on external shell characters such as the more curved dorsal margin and flexed siphonal area in the lectotype of *P. (C.) claviculata* (Figures 5 and 6). It is possible that *P. (C.) claviculata* is a synonym of *P. (C.) cornuta* but our study material and information on habitat were not sufficient to make this determination.

Pandora (Clidiophora) cornuta is supposedly restricted to Panama (Bernard 1983, Keen 1971). Material studied by us (see page 108) shows occurrences at Scammon's Lagoon on the Pacific coast of Baja California Norte, Mexico and in the northern Gulf of California at San Felipe, Puerto Peñasco, Bahía Kino, and Guaymas as well as the published type locality at Panama.

Conclusion: We have determined that *P. (C.) cornuta* belongs in the subgenus *Clidiophora*, the anterior crural element consistently falling just posterior to the anterior muscle scar as in *P. (C.) claviculata*. We observed that *P. (C.) cornuta* and the type of *Clidiophora*,

Fig. 9. *P. (C.) cornuta*, interior of both valves of Gemmell specimen (G-482).

Fig. 10. Exterior of specimen shown in Figure 9.

P. (C.) claviculata, when lying on the inflated valve, orient (anterior to posterior) in the opposite direction from the other Gulf of California pandorids examined. We hypothesize that this may be a subgeneric trait.

The distribution of *P. (C.) cornuta* has been extended from the type locality at Panama to Guaymas and the northern Gulf of California as well as on the Pacific coast at Scammon's Lagoon.

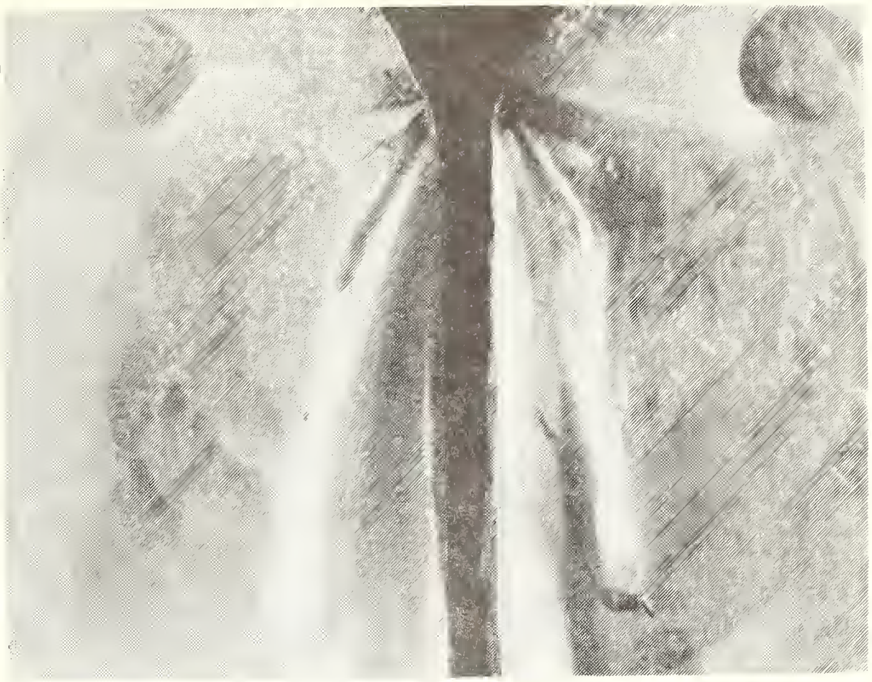


Fig. 11. Photo of hinge and muscle scar of specimen shown in Figures 9 and 10.

MATERIAL STUDIED

SDNHM lots of *Pandora (Clidiophora) cornuta* examined

27189	broken valves, 10 fms., Punta Peñasco, H.N. Lowe, 1934
2605	2 specimens, Scammon's Lagoon, Leg. Henry Hemphill
27187	5 specimens, Scammon's Lagoon, Capt. George D. Porter
57344	2 specimens, Scammon's Lagoon, Leg. Capt. Porter, Cass collection
27193	3 valves (one large valve more curved dorsally as in *P. (C.) claviculata*), Kino Bay, Sonora, Mexico, H.N. Lowe, 1935
8187	2 specimens, Scammon's Lagoon, J.F. Anderson collection
27188	3 valves, Guaymas, 1932
18933	31 specimens, San Felipe, 10 fms., H.N. Lowe, 1935
57343	7 specimens, Scammon's Lagoon

Hanselman collection

7 specimens, trawled 30 fms., off Bahía Kino, Sonora, Mexico by Guaymas fishing boat, December 1968

2 specimens, same locality as above, Hertz collection, ex Hanselman collection

ACKNOWLEDGMENTS

We wish to thank Solene Morris of the British Museum (N.H.) and Kenneth J. Boss of the Museum of Comparative Zoology, Harvard, for the loan ot type material and to the trustees of the British Museum (N.H.) for permission to photograph and publish pictures of the lectotype. William K. Emerson and Walter Sage of the American Museum of Natural History and Peggy Smith, scientific librarian of the San Diego Museum of Natural History, kindly searched for obscure literature needed for this paper. Paul Scott of the Santa Barbara Museum (N.H.) kindly searched the Berry library and sent us a copy of the available *Pandora* section of Species Conchyliorum. Our appreciation goes to George Hanselman for the loan of dredged specimens of *P. (C.) cornuta* from Kino Bay. We also extend our thanks to David K. Mulliner for the fine photographs used in this paper, to Anthony D'Attilio and Jules Hertz for their advice, and to Eugene Coan who read the paper and gave helpful suggestions.

LITERATURE CITED

ABBOTT, R. TUCKER
1974. AMERICAN SEASHELLS, 2nd edition. Van Nostrand Reinhold Co., NY, 663 pp., 34 pls.

ADAMS, C.B.
1852. Catalogue of shells collected at Panama with notes on their synonymy, station and geographical distribution. Ann. Lyceum Nat. Hist. N.Y., vol. 5:229-548.

ALLEN, M.F. & J.A. ALLEN
1955. On the habits of *Pandora inaequivalvis* (Linne). Malac. Soc. London 31: 175-185, 5 figs.

BERNARD, F.R.
1983. CATALOGUE OF THE LIVING BIVALVIA OF THE EASTERN PACIFIC OCEAN: BERING STRAIT TO CAPE HORN. Canadian Spec. Publ. of Fisheries & Aquat. Sci. 61: 102 pp.

BOSS, K.J. & A.S. MERRILL
1965. The family Pandoridae in the western Atlantic. Johnsonia 4(44):181-215, pls. 115-126.

CARPENTER, P.P.
1856. Descriptions of (supposed) new species and varieties of shells, from the Californian and west Mexican coasts, principally in the collection of Hugh Cuming Esq.. Proc. Zool. Soc. London for 1855:228-235.
1864. Contributions towards a monograph of the Pandoridae. Proc. Zool. Soc. London for 1864:596-603

CONRAD, T.A.
1837. Description of marine shells from Upper California collected by Thomas Nuttall, Esq., Jour. Acad. Nat. Sci. Phila. 7(2):227-688, pls. 17-20.
1863. Catalogue of the Miocene shells of the Atlantic slope. Proc. Acad. Nat. Sci. Phila. for 1862, vol. 14:559-582.

DALL, W.H.
1903. Contributions to the Tertiary fauna of Florida.... Trans. Wagner Free Inst. of Sci. of Phila. 3(6) 1654 pp., pls. 48-60.

GEMMELL, J.
1975. Shrimp boat shelling. The Festivus 6(6):32-36, 1 fig.

__________, HERTZ, C.M., B.W. MYERS
1980. Seastar predation on mollusks in the San Felipe Bay area, Baja California, Mexico, The Festivus 7(3):24-55, 51 figs.

KEEN, A.M.
1958. SEA SHELLS OF TROPICAL WEST AMERICA. Stanford Univ. Press., Stanford. 624 pp., illus.
1971. SEA SHELLS OF TROPICAL WEST AMERICA, 2nd ed. Stanford Univ. Press., Stanford. 1064+ pp., illus.

LINNE, C.
1767. SYSTEMA NATURAE PER REGNA TRIA NATURAE. Edito duodecima, reformata. Stockholm. Regnum animale 1, pt. 2, 1327 pp. + 32 pp. addendum.

MORTON, B.
1981. The Anomalodesmata. Malacologia 21(1-2):35-60, 17 figs.

OLSSON, A.A.
1961. MOLLUSKS OF THE TROPICAL EASTERN PACIFIC.. PANAMIC-PACIFIC PELECYPODA. Paleo. Res. Inst., Ithaca NY, 574 pp., 86 pls.

PALMER, K.V.W.
1963. Type specimens of marine Mollusca described by P.P. Carpenter from the west coast of Mexico and Panama. Bull. Amer. Paleo. 46(211):289-408, pls. 58-70.

PILSBRY, H.A. & H.N. LOWE
1932. West American and Central American mollusks collected by H.N. Lowe, 1929-31. Proc. Acad. Nat. Sci. Phila. 84:33-144, 17 pls.
SHERBORN, C.D.
1922. INDEX ANIMALIUM. London., Ser. 2, pts. 1-4, (A B) Bibliography pp. xvi-cxxxix.
SOWERBY, G.B. (1st of name)
1830. In Broderip & Sowerby. SPECIES CONCHYLIORUM. vol. 1, part 1, pp. 1-3, 1 pl.
1835. Undescribed shells contained in Mr. Cuming's collection. Proc. Zool. Soc. London. pp. 93-96.
SOWERBY, G.B. (2nd of name)
1874. In Reeve. CONCH. ICONICA. vol. XIX, *Pandora*, 23 species, 3 pls.
TURNER, R.D.
1956. The eastern Pacific marine mollusks described by C.B. Adams. Occ. Pap. on Mollusks, M.C.Z. Harvard Univ. 2(20):21-135, pls. 5-21.
YONGE, C.M. & B. MORTON
1980. Ligament and lithodesma in the Pandoracea and the Poromyacea with a discussion on evolutionary history in the Anomalodesmata (Mollusca: Bivalvia). Jour. of Zool. London. 191:263-288, 16 figs.

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MEMBERSHIP AND SUBSCRIPTION

Annual dues are payable to San Diego Shell Club. Single member: $7.00; Family membership: $8.00; Overseas (surface mail): $10.00
Address all correspondence to the San Diego Shell Club, Inc., c/o 3883 Mt. Blackburn Ave., San Diego, CA 92111
Single copies of this issue: $5.00. Postage is additional.
Meeting date: third Thursday, 7:30 P.M. Room 104, Casa Del Prado, Balboa Park

PROGRAM

Lee Olsen, President of the San Diego Council of Divers, will give an illustrated talk on the Abalone Planting Project in San Diego County. He will also bring in related display items.

Meeting date: 21 November

CONTENTS

The Festivus welcomes all contributions which further the understanding of mollusks. Both popular and scientific articles are actively solicited. At this time The Festivus does not publish descriptions of new taxa.

Publication date: The publication date of The Festivus appears on the masthead above. The Festivus is published monthly except December.

ADDISONIA BROPHYI MCLEAN, 1985 FOUND IN THE GULF OF CALIFORNIA, MEXICO

BY

CAROL SKOGLUND

3846 E. Highland Avenue, Phoenix, Arizona 85018

Addisonia brophyi McLean, 1985 (Figures 1 and 2) lives in spent egg cases of sharks and has been reported as occurring between Gaviota, Santa Barbara County and Santa Catalina, Los Angeles County, both in California (McLean 1985).

A single dead 9 mm specimen was taken by Paul and Carol Skoglund in October 1984 while dredging 65 to 135 meters off Danzante Island (25°45'N, 111°15'W) in the Gulf of California, Mexico. No shark egg case was seen. This occurrence places this species in the Panamic province.

I would like to thank Dr. James H. McLean of the Los Angeles County Museum of Natural History for verifying the identification of the specimen and Mr. David K. Mulliner for photographing it.

Literature Cited

MCLEAN, JAMES H.

1985. The Archaeogastropod Family Addisoniidae Dall, 1882: Life Habit and Review of Species. Veliger 28(1):99-108 (1 July 1985).

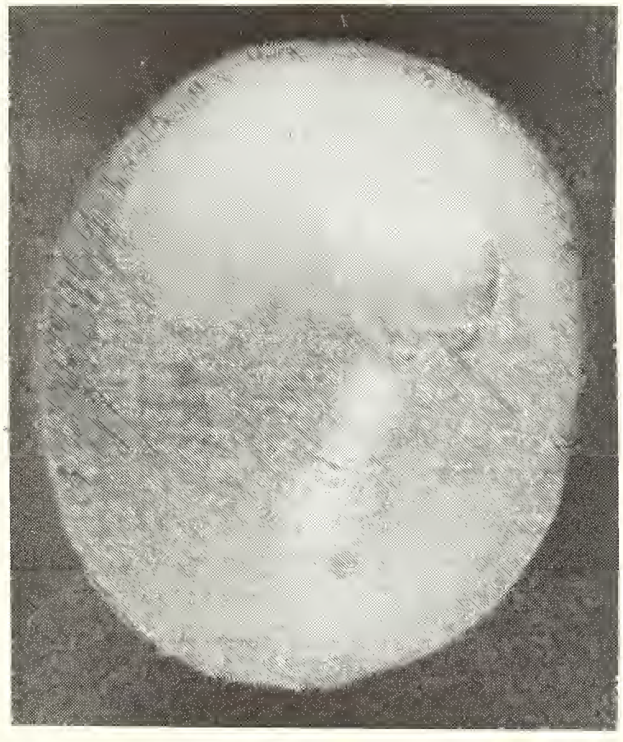

Fig. 1. Exterior view of *Addisonia brophyi*. Skoglund collection

Fig. 2. Interior of specimen shown in Figure 1.

MORE ON THE VALIDITY OF CYPRAEA AEQUINOCTIALIS (SCHILDER, 1933)

BY

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In a recent issue of The Festivus, Bradner (1985) discussed the status of *Cypraea aequinoctialis* (Schilder, 1933). He concluded that it is a valid species and compared it with *C. annettae* Dall, 1909. The recognized distribution of *C. aequinoctialis* is from Panama to northern Peru. We here extend the known distribution of this species to Nicaragua, where we have found six dead specimens and several fragments along 53 kilometers of the coast of Carazo Province, from La Boquita (11°40'40"N, 86°22'30"W) to Chococente (11°32'06"N, 86°11'15"W). These specimens extend the known distribution 1,400 kilometers northward from Panama Bay. The largest specimen we have found measures 49.5 mm in length, 29 .00 mm width, and 24.35 mm in height. We have yet to encounter living specimens.

The validity of this species has been much debated. After describing this species in 1933, Schilder & Schilder (1971) rated it as a subspecies. Keen (1971), Taylor & Walls (1975), and Wagner & Abbott (1978) also rank it as a subspecies of *C. annettae*. Abbott (1974), by implication, makes it a synonym of *C. annettae*. Listing it as a separate species are Burgess (1970), Olsson (1971), and Abbott & Dance (1982).

Bradner (1985) showed that there are consistent, measurable differences between the two species in length/width ratio, the number of columellar teeth, and the number of labial teeth. Our measurements of the specimens we have collected in Nicaragua support Bradner's conclusion (Table I). [The counts of teeth have been reduced to those of a specimen of 25 mm in length, following the methods of Cernohorsky (1971)]

TABLE I

Comparison of L/W, columellar teeth and labial teeth

	C. annettae			*C. aequinoctialis*					
	Bradner (1985)			Bradner (1985)			Nicaragua		
	No.	$\bar{x}$	sd	No.	$\bar{x}$	sd	No.	$\bar{x}$	sd
Length/Width (L/W)	53	1.81	0.077	21	1.63	0.062	6	1.62	0.069
Columellar teeth	53	14.40	1.098	21	12.43	1.248	6	13.50	0.630
Labial teeth	28	19.82	1.867	10	18.30	0.949	9*	16.77	1.250

* This number includes measurements made on the fragments.

The Nicaraguan specimens were found some 2,200 kilometers south of the southernmost known occurrence of *C. annettae* at Puerto Vallarta, Mexico (Bradner 1985). If *C. aequinoctialis* were only a subspecies of *C. annettae*, one might expect specimens from Nicaragua to be intermediate in morphology between the two taxa. Such is not the case. The length/width ratio is close to that of southern *C. aequinoctialis*, and the number of labial teeth is still fewer than those of southern *C. aequinoctialis*. The number of columellar teeth is intermediate between the two.

LITERATURE CITED

ABBOTT, R.T.
1974. AMERICAN SEASHELLS, Second edition. Van Nostrand Reinhold, New York, 663 pp.

ABBOTT, R.T. & S.P. DANCE
1982. COMPENDIUM OF SEASHELLS. Dutton, New York, 411 pp.

BRADNER, H.
1985. *Cypraea annettae* Dall, 1909 vs *C. aequinoctialis* Schilder, 1933; a statistical, optical, and SEM comparison. Festivus 17(6):54-58.

BURGESS, C.M.
1970. THE LIVING COWRIES. Barnes, New York, 389 pp.

CERNOHORSKY, W.O.
1971. MARINE SHELLS OF THE PACIFIC. Pacific Publ., Sydney, Australia. 248 pp.

DALL, W.H.
1909. Some notes on *Cypraea* of the Pacific coast. Nautilus 22(12):125-26.

KEEN, A.M.
1971. SEA SHELLS OF TROPICAL WEST AMERICA, Second edition. Stanford Univ. Press., Stanford, Calif., 1064+ pp.

OLSSON, A.A.
1971. Mollusks from the Gulf of Panama collected by R/L John Elliot Pillsbury, 1967. Bull. Marine Sci. 21(1):35-92.

SCHILDER, F.A.
1933. Beitrage zur kenntnis der Cypraeacea VI. Zool. Anzeiger 101:180-193.

SCHILDER, M. & F.A. SCHILDER
1971. A catalogue of living and fossil cowries: taxonomy and bibliography of Triviacea and Cypraeacea... Mem. Inst. Roy. Sci. Belgique 2(85):1-246.

TAYLOR, J. & J.G. WALLS
1975. COWRIES. T.F.H. Publ., Neptune City, N.J. 288 pp.

WAGNER, R.J.L. & R.T. ABBOTT
1978. Wagner and Abbott's standard catalog of shells. Amer. Malac., Greenville, Delaware. 450 pp.

COMMENTS ON THE MURICINAE GENUS PURPURELLUS JOUSSEAUME, 1880

BY

ANTHONY D'ATTILIO

Department of Marine Invertebrates, San Diego Natural History Museum, Balboa Park,
P.O. Box 1390, San Diego, California 92112

In the "Salute" to the Doctors Vokes by Aurora Richards in the April 1985 issue of Hawaiian Shell News, a species figured in the lower left hand corner of page 1 is labelled as a *Pterynotus* species. This species is illustrated here in Figures 1 and 2 courtesy of Dr. Emily Vokes. It is not a *Pterynotus*, but belongs to the genus *Purpurellus* which differs from *Pterynotus* in more than one respect.

Fig. 1. *Purpurellus* sp. x 2 Gurabo Formation, Dominican Republic.

Fig. 2. Dorsal view of specimen shown in Figure 1.

In *Purpurellus* the apertural rim (peristome) is entire, that is it does not outwardly lead in to the siphonal canal. The siphonal canal is entirely closed on its surface by the left side of the canal, completely and adherently overlapping the right side. This trait, strangely enough, is also typical of most typhine species. In addition, in *Purpurellus* the posterior portions of the varical flanges fold over on the ventral surface and there they are tightly adherent to the remaining flange. By contrast, *Pterynotus* has an open canal, the flange is simple without the overlap at the posterior of each whorl. For further discussion of the flange in *Pterynotus* and *Purpurellus* see D'Attilio (1982). Although the photographs of the *Purpurellus* shown here in Figures 1 and 2 are not too clear, the above mentioned characters may, nonetheless, be noted.

The known distribution of *Purpurellus* consists of one living species on the west coast of Africa, *P. gambiensis* (Reeve, 1845), (Figure 3), and two living species in the tropical eastern Pacific, *P. macleani* (Emerson & D'Attilio, 1969) and *P. pinniger* (Broderip, 1833) (Figure 4). The Recent species of *Purpurellus* are illustrated and described in Radwin & D'Attilio (1976).

Although there is no living species of *Purpurellus* in the Caribbean or western Atlantic, there is a fine fossil, *P. repetiti* (E.H. Vokes, 1970) (Figures 5-7),

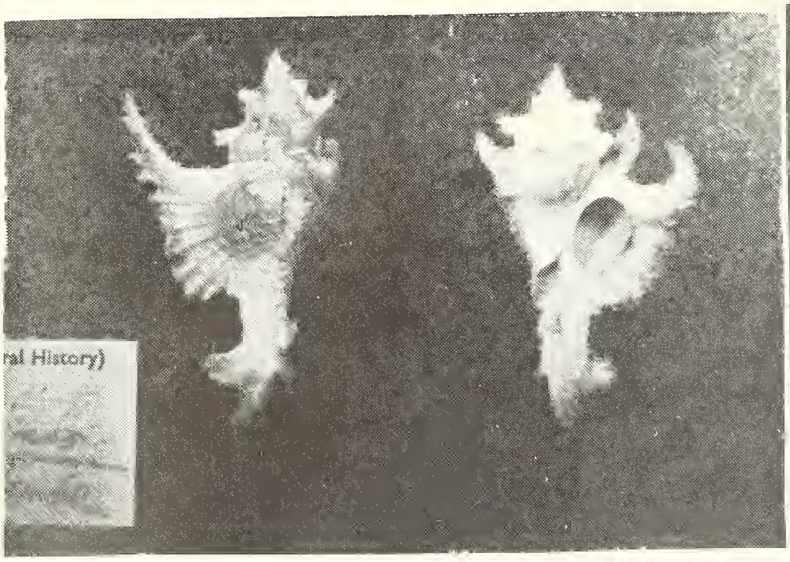


Fig. 3. *P. gambiensis*, Type, British Museum (N.H.)

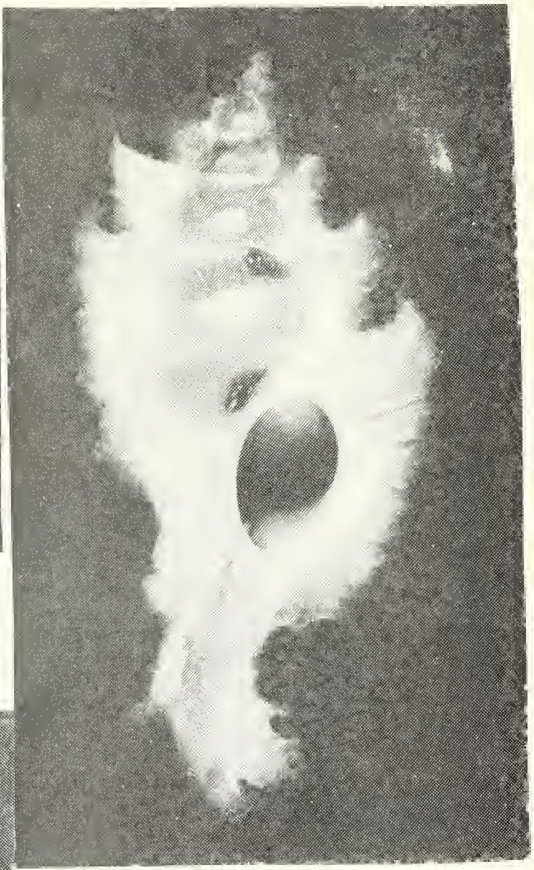


Fig. 4. *P. pinniger*, x 2, lectotype, 53mm L, 25mm W

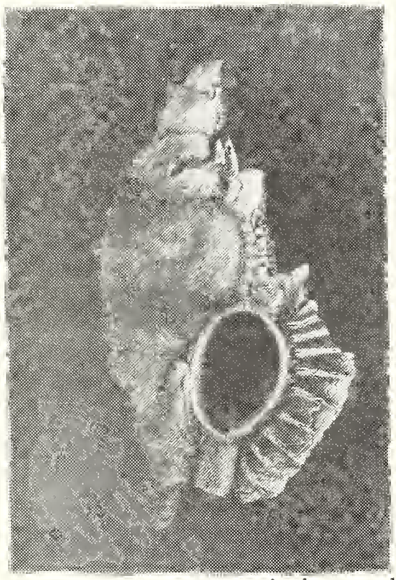


Fig. 5. *P. repetiti*, x 1¼ Upper Oligocene, Silverdale, N.C.

Fig. 6. Dorsal view of specimen in Figure 5

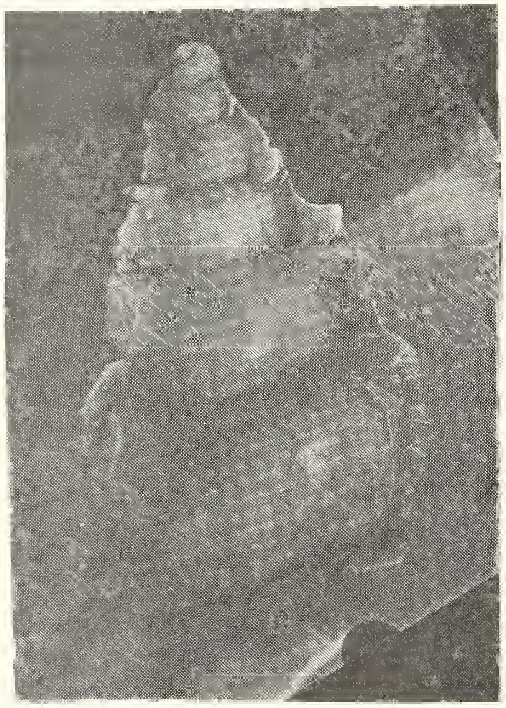


Fig. 7. Detail of spire of *P. repetiti*, x 10

which is the oldest fossil species of *Purpurellus* from the upper Oligocene at Silverdale, North Carolina.

The magnificent fossil specimen figured in Hawaiian Shell News and the specimen shown here in Figures 1 and 2 is a newly found species that Dr. Vokes has in press. Although a western Atlantic fossil, it appears to be most closely related to *P. gambiensis*, the west African species. *Purpurellus osseus* (Reeve, 1845), was also described from west Africa although the species has most often been considered a junior synonym of *P. gambiensis.* The taxonomic status of the one or two fossil forms or species in the eastern Pacific has not been satisfactorily established.

The radula for *P. gambiensis* is figured in Thiele's Systematischen Weichtierkunde. Because the pair of lateral teeth are relatively so large in proportion to the rachidian plate, George Radwin and I extracted and drew a figure of the radula of *P. gambiensis* which agreed essentially with the figure of Thiele. It was never published, however, and is shown here in Figure 8.

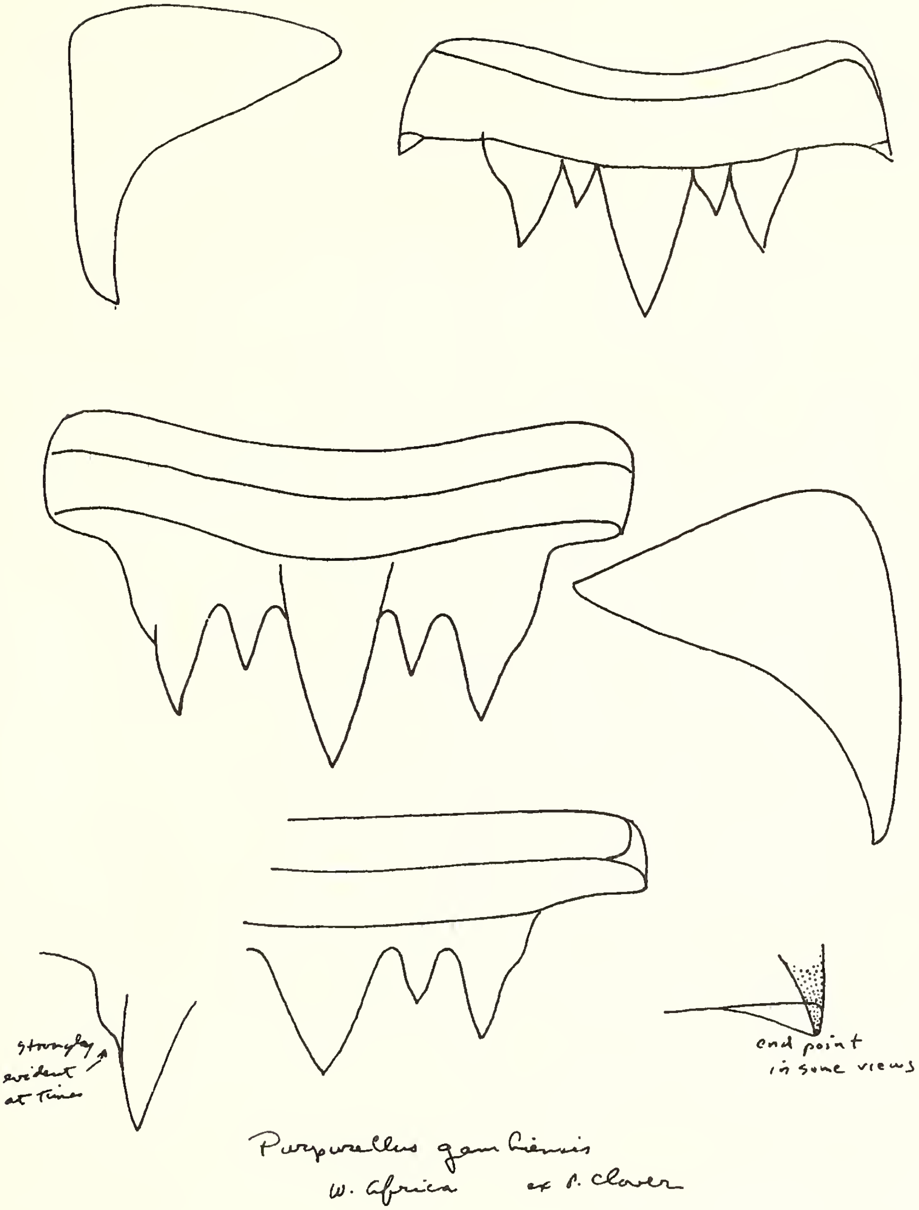


Fig. 8. Radula of *Purpurellus gambiensis* taken from a specimen in the Philip Clover collection.

Acknowledgment

My thanks to Dr. Emily H. Vokes for making her photographs of the fossils available to me for this paper.

Literature Cited

D'ATTILIO, ANTHONY
1982. The flange as a modification of varical sculpture in the Muricidae. Festivus 14(5):58-59.

RADWIN, GEORGE E. & ANTHONY D'ATTILIO
1976. MUREX SHELLS OF THE WORLD. Stanford Univ. Press, Stanford, CA, 284 pp., 32 pls., 192+ text figs.
RICHARDS, AURORA
1985. A salute to both Doctors Vokes. Hawaiian Shell News 33(4):1,8, 4 figs.
THIELE, JOHANNES
1929. HANDBUCH DER SYSTEMATISCHEN WEICHTIERKUNDE. Jena, Gustav Fischer. Bd. I, Teil II, pp. 1-376, 470 text figs.
VOKES, EMILY H.
1970. Cenozoic Muricidae of the western Atlantic region Part V— *Pterynotus* and *Poirieria*. Tulane Stud. in Geol. & Paleo. 8(1):1-50, 7 pls., 1 text fig. (June 17).

CLUB NEWS

FROM THE MINUTES - SAN DIEGO SHELL CLUB MEETING - 17 OCTOBER 1985

Members Carole and Jules Hertz presented a most interesting account of their visit to New Zealand this past spring. Their excellent color slides gave us a comprehensive look at both the North and South Islands. Included in their experiences were a helicopter flight over a glacier, a boat ride on a fiord, a visit to a sheep ranch, a cave exploration and a walk through the thermal areas. They also made many excursions to various beaches for collecting; one beach had giant sized geodes strewn along the sand, another area covering some 26 miles was loaded with shells that had been washed up after storms. On display were many of the shells they collected on this trip together with brochures, maps, pamphlets etc. of and about New Zealand.

Business meeting: The Executive Board presented the following slate of officers for the year 1986. Voting will take place at the November meeting.

President	Richard Herrmann
Treasurer	Nola Michel
Recording Secretary	Wesley Farmer
Corresponding Secretary	Ian Hamilton

The Board was unable to find a member for Vice-President. Nominations for this position will be taken at the November meeting.

NEW MEMBER

RICE, TOM, P.O. Box 219, Port Gamble, WA 98364

THE ANNUAL CLUB CHRISTMAS PARTY

The annual Club Christmas party will be held on 7 December 1985. For information and map see last page of this issue.

DUES RAISE FOR 1986

It will soon be time to renew memberships for 1986. The Club approved a raise in the dues to $10.00 for a single membership, $12.00 family, and $12.00 overseas (surface mail).

THE FESTIVUS DOES NOT PUBLISH A DECEMBER ISSUE.

OTALA LACTEA (MÜLLER, 1774) IN SAN DIEGO COUNTY, CALIFORNIA

BY

CAROLE M. HERTZ

Department of Marine Invertebrates, San Diego Natural History Museum, Balboa Park, P.O. Box 1390, San Diego, California 92112

The occurrence of *Otala lactea* in San Diego County was brought to my attention in a unique manner. During a conversation with Anthony D'Attilio, Acting Chairman of the Department of Marine Invertebrates of the San Diego Natural History Museum, in the Department office, I noticed something peculiar on the wall across the room. I thought I saw a snail shell stuck on a picture frame. Strangely, on closer examination, it was a snail estivating on a framed lithograph. It had been brought in for identification a day earlier by Richard Cerutti, a field associate in the Museum's Paleontology Department. At that time it had been hibernating on a leafless branch. Tony D'Attilio identified the mollusk as *Otala lactea* (Figure 1) and placed the branch with the snail on the sink counter. When I arrived the next morining, the snail had moved to the picture frame--an art connoisseur perhaps--and had already secreted a thin sheet of mucus or epiphragm on the frame.

Fig. 1. *Otala lactea* (Müller, 1774) on a lettuce leaf. Specimen collected by Richard Cerutti on 16 September 1985. Shell length: 37.1 mm, altitude: 22± mm

I found the occurrence of this sturdy and attractive land snail (seen under the camera lights by Dave Mulliner to be a pale translucent green with white dots) exciting since I had never seen the species before. Tony D'Attilio mentioned that when he lived in New York City his family used to buy the *Otala* (milk snails) from bushel baskets in the fish markets where they were imported from the Mediterranean. He remembered fondly the delicious dinners of *Otala* smothered in tomato sauce.

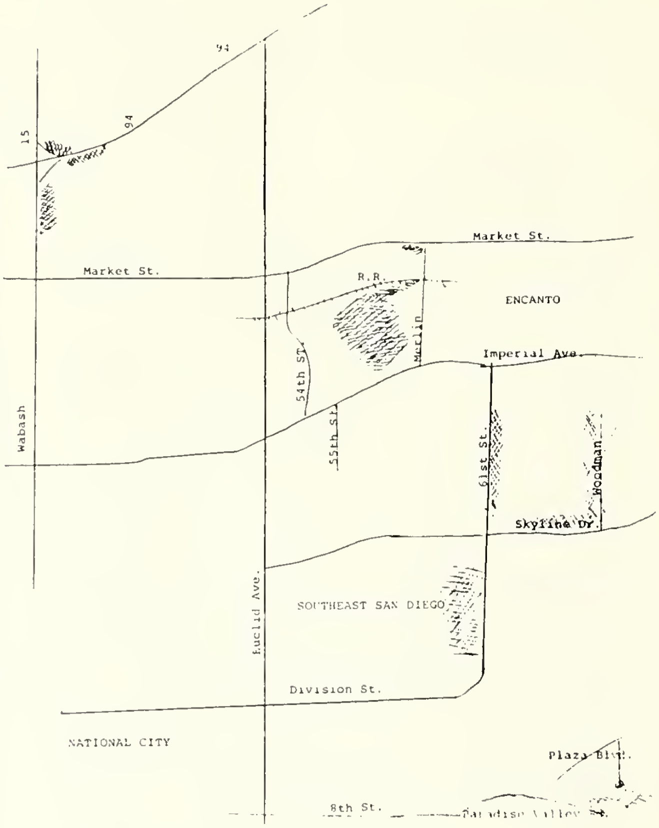
In speaking with Richard Cerutti, I learned that he had found the live specimens at the Gateway Center East Project at Market Street and Interstate 15 in San Diego County (see map insert) on branches facing the west side of the project. He was sure that he had also found this species in the early 1970s off Paradise Valley Road in National City. Noticing the interest in the department, Richard came in two days later (18 September 1985) with a large clump of buckwheat (*Eriogonum fasciculatum*) (identified by Jim Dice, curatorial assistant in the Botany Department) which was completely decorated by *Otala lactea* of various sizes. These

specimens were found in a vacant lot between Paradise Valley Road and Blue Bonnet Court at Plaza Boulevard Extension East (see map), just about where Richard believed he had found them years ago.

Joyce Gemmell, Department associate and vegetable gardening instructor at Foothills Adult Education Center, brought the clump of "decorated" buckwheat to the San Diego County Department of Agriculture, Weights and Measures. Study of their published records showed that *Otala lactea* has been in the county for some time. The species is native to areas on the Mediterranean and has become established in some of our southern states (Jacobson & Emerson 1961) and Bequaert & Miller (1973) reported it in Arizona in "Phoenix (NE section, Apr. 1970) and Tucson...living adults and immatures repeatedly found in the open ...in N Jackson Ave area, in irrigated gardens and adjoining vacant lots from 1965 to 1970." Rick Williams of the Agriculture Department told me that *O. lactea* is found in seven counties from Bonsall and Oceanside as far south as San Ysidro, most often in the drier areas (rather than coastal). They have been seen in gardens in areas such as Encanto and will eat cultivated plants.

Certainly the locality on the wall of the Marine Invertebrate Department had not been noted before!

AREAS OF <u>OTALA LACTEA</u> INFESTATION LOCATED BY RICHARD CERUTTI IN OCTOBER 1985



Map by R. Cerutti, greatly reduced, is not to scale. Crosshatching denotes infestation areas.

Acknowledgments

My appreciation to Richard Cerutti who sparked our interest in *Otala lactea* by bringing this mollusk into the department and providing considerable information on its distribution in San Diego County and to Anthony D'Attilio, James Dice, Joyce Gemmell, and Rick Williams who provided information concerning *O. lactea* and to David K. Mulliner who took the fine photograph of the living mollusk.

Literature Cited

BEQUAERT, JOSEPH C. & WALTER B. MILLER
1973. Mollusks of the arid southwest with an Arizona check list. U. of Ariz. Press. 271 pp., 7 figs.

JACOBSON, MORRIS K. & WILLIAM K. EMERSON
1961. Shells of the New York City area. Argonaut Books Inc. N.Y. 142 pp. illus.

MÜLLER, OTHONE F.
1773. Vermium terrestrium et fluviatilium...vol. 2:19. Havnie et Lepsiae.

A SELECTED INDEX TO VOLUME XVII (1985)

AUTHOR INDEX

THE ANNUAL CLUB CHRISTMAS PARTY -- 7 DECEMBER 1985

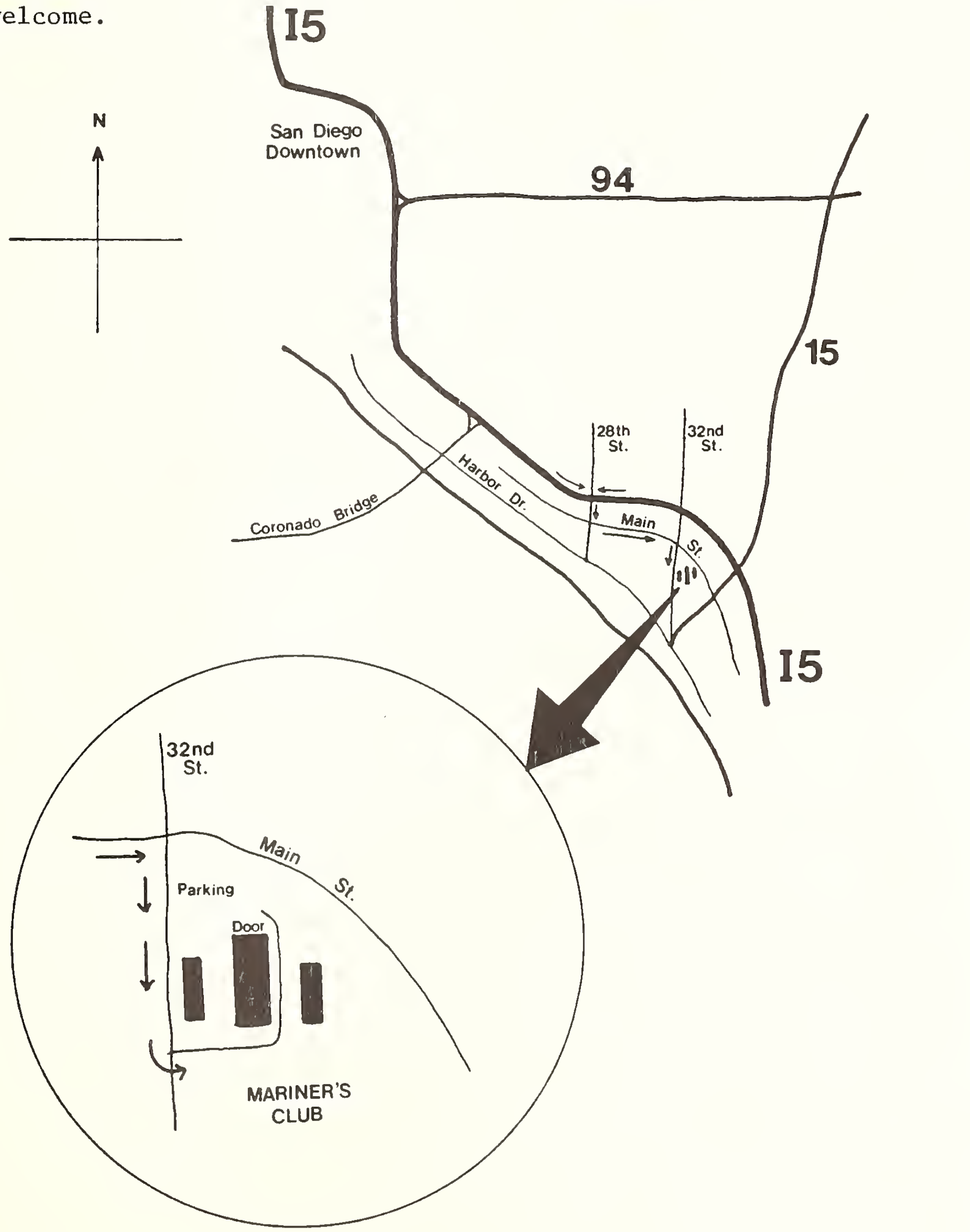
The Club Christmas party will be held in the Destroyer Room at the Mariner Officers' Club, 32nd St. Naval Station. The festivities begin at 6:00 P.M. with no host cocktails. Dinner will be at 7:00 P.M. The menu is as follows:

Roast Cornish game hen with wild rice stuffing, vegetables, dinner salad, rolls, dessert, coffee or tea. The Club will provide complimentary dinner wine.

Following dinner and the traditional Club shell gift exchange, there will be dancing to the music of a "mellow" band in the main room. The cost for the evening, including gratuities is $10.00 per person. Deadline for reservations is Monday, December 2. Checks should be made payable to The San Diego Shell Club, Inc. and given to Treasurer Nola Michel at the November meeting or sent to the Club address (front page).

Remember to participate in the traditional shell gift exchange. Bring your gift wrapped shell to place under the tree. Place data and name inside the package only. On the outside place only general locale i.e. Caribbean, eastern Pacific, etc. Numbers will be drawn and those bringing a shell gift will choose one from under the tree.

It will be a great party, as usual. Come and enjoy the season with your friends. Guests are welcome.



THE FESTIVUS

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MEMBERSHIP AND SUBSCRIPTION

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Meeting date: third Thursday, 7:30 P.M. Room 104, Casa Del Prado, Balboa Park

PROGRAM

Motion Pictures of Nudibranchs
(swimming, predation and experimental)
will be presented by Wesley Farmer

Meeting date: 16 January

CONTENTS

CLUB NEWS

THE ANNUAL CHRISTMAS PARTY

Thirty members and guests enjoyed the holiday festivities together in the Destroyer Room of the Mariners' Club. The room was decorated for the season complete with June King's poinsettias in shells on the tables and gifts under the Club's tree.

After cocktails, many toasts (a special one to our host, John Souder), and a delicious dinner of Cornish game hen followed by a sinfully rich chocolate mousse cake, Master of Ceremonies, Dave Mulliner thanked the 1985 officers and installed the officers for 1986. Marty Schuler then turned over the Club's charter member plaque and rosewood gavel to Richard Herrmann and the ceremony was complete.

A slide show presentation of Club members "partying" from the 1960s to the present brought much laughter and many shouts of "not so fast." The traditional gift exchange ended the planned festivities after which many members regrouped in the main room for dancing. It was a lovely party.

PUBLICATIONS RECEIVED

Aspects of the morphology of the endemic South African Cypraeidae with a discussion of the evolution of the Cypraeacea and Lamellariacea, by Terrence Gosliner & William R. Liltved, 1985. Ann. S. African Mus. 96(4):122 pp. [To be reviewed in the February issue of The Festivus]

ILLUSTRATED CATALOGUE OF LATIAXIS AND ITS RELATED GROUPS by Sadao Kosuge & Masaji Suzuki, 1985. Spec. Publ. 1, Inst. Malac, Tokyo, 83pp., 50 pls. [See review on p.8, this issue.]

The aeolid nudibranch family Aeolidiidae (Gastropoda, Opisthobranchia) from tropical southern Africa, by Terrence Gosliner, 1985. Ann. S. African Mus. 95(6):267 pp.

Editor's note: These publications will be available for circulation in the Club library at the January meeting.

FROM THE MINUTES - SAN DIEGO SHELL CLUB MEETING - 21 NOVEMBER 1985

Lee Olsen, President of the San Diego Council of Divers, was our speaker for the evening. He spoke on the Council's abalone planting project off the Pt. Loma coast. The "Ocean Projects " is funded by a grant from the San Diego County Fish and Game Commission and employs a planting technique developed by Dr. David Leighton of Abalone Mariculture Enterprises Corporation. Ten thousand half inch red abalone (*Haliotis rufescens* Swainson, 1822) were donated to the project by ARCO. The baby abalone were placed in specially designed "abalone condos" 200 to each unit. After attaching a brick to anchor them to the bottom, divers placed the units under rocks and in crevices at a depth of approximately 60 feet.

According to Olsen, future plantings will include green abalone (*Haliotis fulgens* Philippi, 1845) and white abalone (*Haliotis sorenseni* Bartsch, 1940). It is hoped that by seeding the areas with small abalone, the species may be restored to the plentiful numbers of 30 years ago.

Anyone wishing to donate time or money to the project is asked to contact the San Diego Council of Divers, P.O. Box 9259, San Diego, CA 92109.

Election of officers was conducted at the business meeting. The officers for 1986 are as follows: President- Richard Herrmann; Vice President- Wesley Farmer; Corresponding Secretary- Ian Hamilton; Recording Secretary- no nominee;* Treasurer- Nola Michel.

Barbara W. Myers

*At the December Board meeting, Ginny Outwater accepted the nomination as Recording Secretary and was elected at the December party at which time she was installed with the other officers.

UPDATE ON MOLLUSKS WITH INDO-PACIFIC FAUNAL AFFINITIES IN THE TROPICAL EASTERN PACIFIC IV*

BY

DONALD R. SHASKY

834 West Highland Avenue, Redlands, California 92373

In 1983 Frank Bernard published a CATALOGUE OF THE LIVING BIVALVIA OF THE EASTERN PACIFIC OCEAN. This list is somewhat difficult to use since, with the exception of the Galapagos Islands, Cocos Island, and Clipperton Island, he does not cite specific localities for any of the species. He lists distributions in degrees latitude.

Two of the species listed below that I collected at Cocos Island (*Lopha folium* and *Malleus regulus*) have already been reported from the Panamic fauna in Bernard's catalogue, but I could not determine exact localities. I want to thank Frank Bernard for the identification of the bivalves listed here. Recently while he was at the Santa Barbara Museum of Natural History, Paul Scott was kind enough to show him some of my problem species.

Lopha folium (Linnaeus, 1758) This species is cosmopolitan. One specimen was on a detached sea urchin (*Eucidaris*) spine taken at a depth of 13 meters off Isla Pajara, Cocos Island (Figures 1 and 2). I have two additional specimens, also on detached *Eucidaris* spines from 8 meters, Pulmo Reef, Baja California Sur.

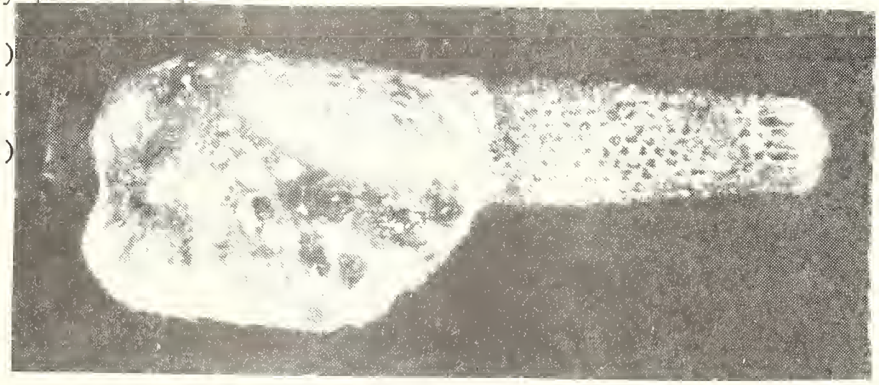

Fig. 1. *Lopha folium* on sea urchin spine

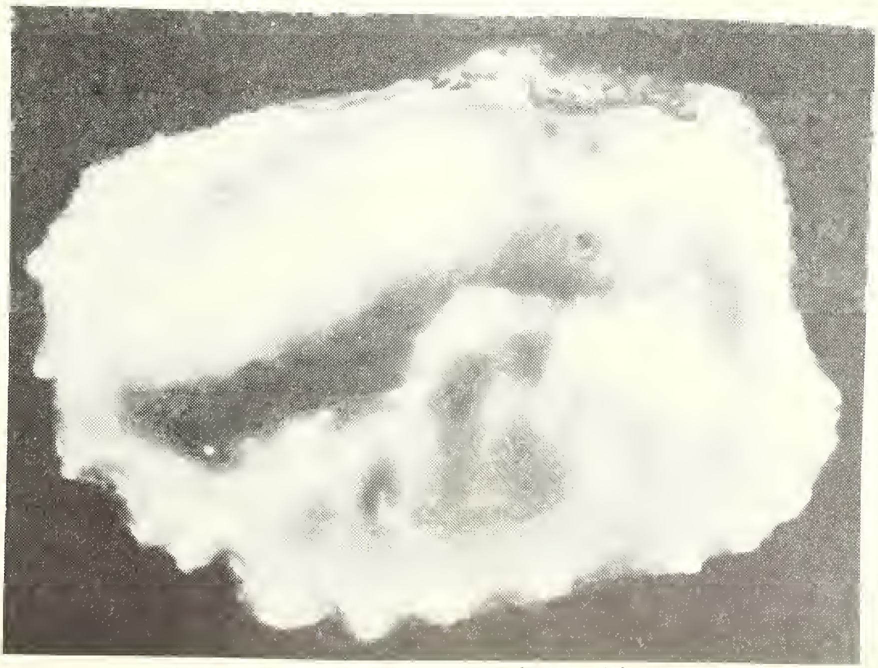

Fig. 2. Interior of valve of *Lopha folium*

*Adapted from a paper presented to the annual meeting of the Western Society of Malacologists - August 1985

Malleus regulus (Forskal, 1775) (Figures 3 and 4). Two years ago, in Seattle, I reported finding *Spondylus hystrix* (Bolten, 1798) at Cocos Island. R. Tucker Abbott later informed me (pers. comm.) that *S. nicobaricus* Schreiber, 1793) was an earlier name. I note this since *S. nicobaricus* is the host of *Malleus regulus*. *M. regulus* is usually attached under the spines of its host and taken in depths of 17-27 meters.

Isognomon incisum (Conrad, 1837). This species was described from Hawaii and up to now has been known only from there to my knowledge. It is very common intertidally at Wafer and Chatham Bays, Cocos Island. It is shown here in Figures 5 and 6.

Cardita aviculina (Lamarck, 1819) (Figure 7). This species is very common at Cocos Island from the intertidal to depths of at least 30 meters.

Triphora triticea (Pease, 1861) is shown in Figure 8. Bert Draper, who has extensively studied the Panamic Triphoridae and who also works with Hawaiian micromollusks, identified this species for me. *T. triticea* was described from Hawaii, but is widely distributed in the Indo-Pacific. I have taken it at various sites at Cocos Island in depths of 13-33 meters.

Fig. 3. *Malleus regulus*, exterior view.

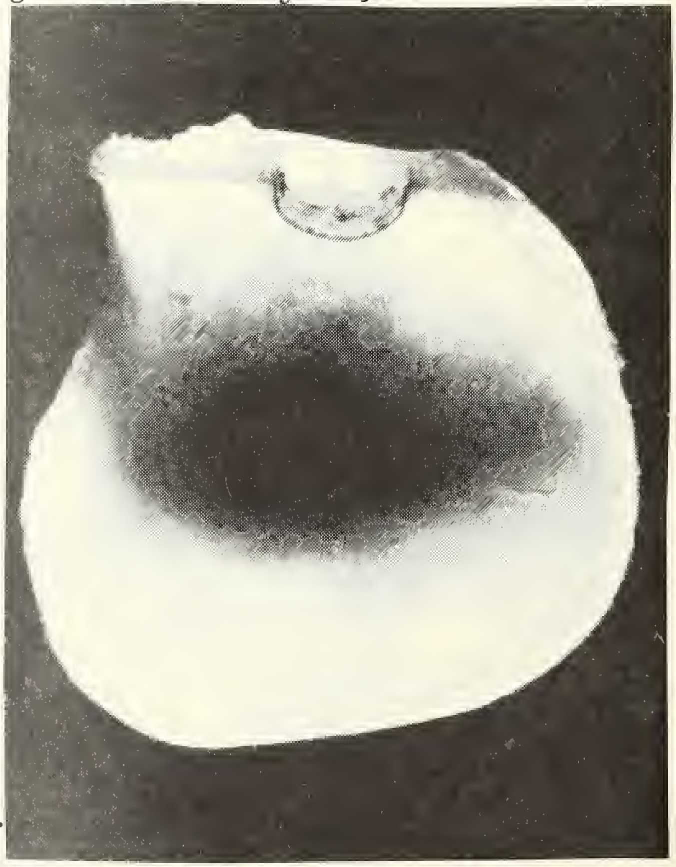

Fig. 4. Interior of valve of *M. regulus*

Bibliography

BERNARD, F.R.
1983. Catalogue of the living Bivalvia of the eastern Pacific Ocean: Bering Strait to Cape Horn. Canad. Spec. Publ. Fish. & Aquatic Sci. 61:i-vii +1-102

KAY, E.A.
1979. Hawaiian marine shells. Reef and shore fauna of Hawaii. Bernice P. Bishop Mus. Spec. Publ. 64(4):i-xviii + 1-163, 195 figs.

Editor's note: David K. Mulliner kindly prepared the black and white prints from Donald R. Shasky's original color slides.

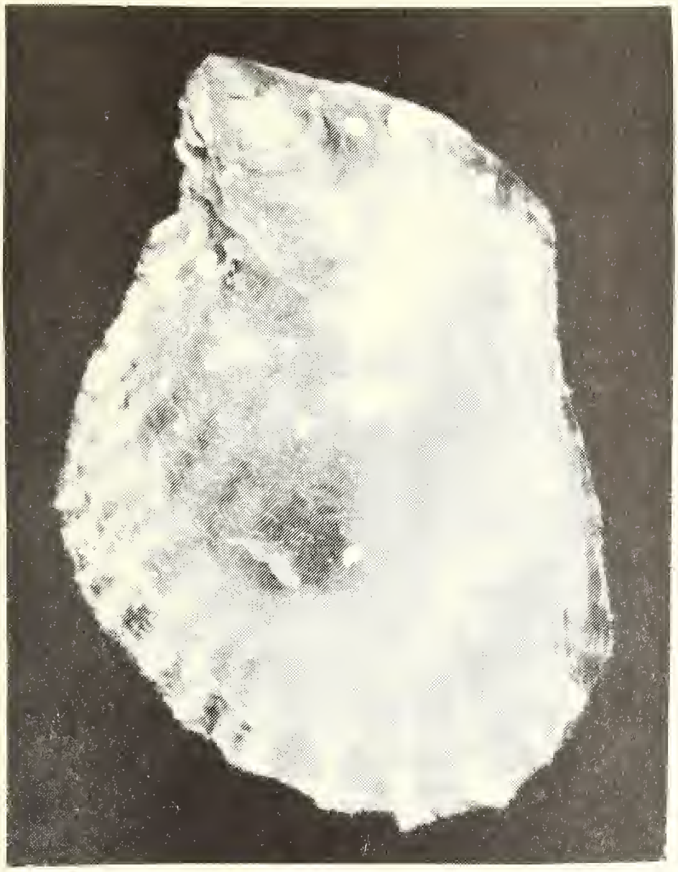
Fig. 5. *Isognomon incisum,* exterior view

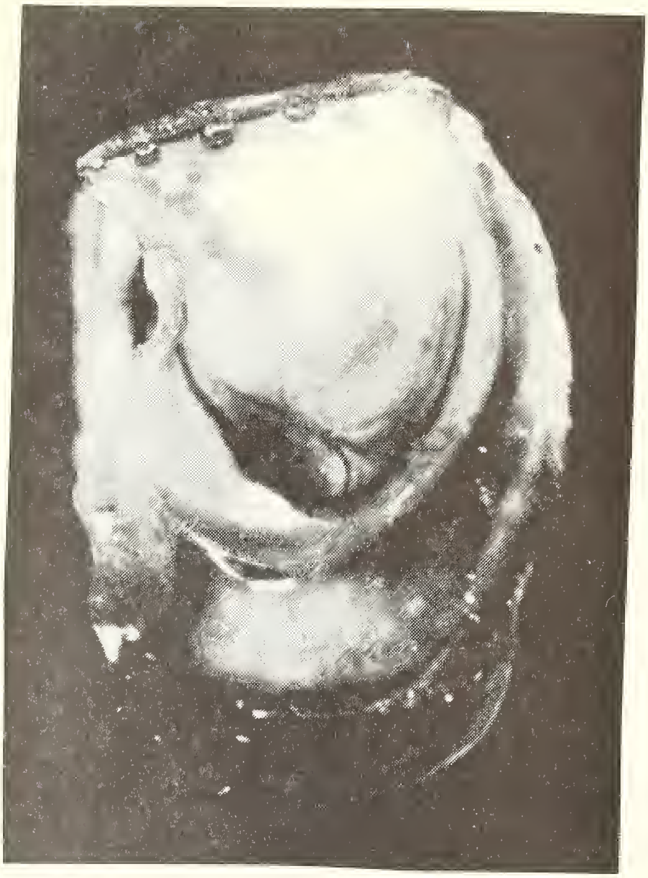
Fig. 6. *I. incisum,* interior of valve


Fig. 7. *Cardita aviculina,* exterior view

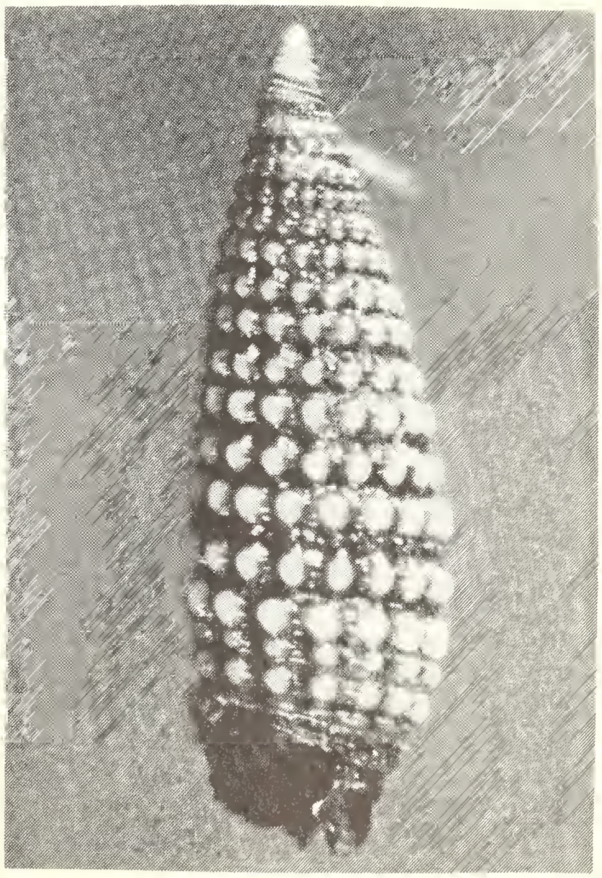
Fig. 8. *Triphora triticea*

PROJECT DATA LOG: SPAWNING RECORDS OF EASTERN PACIFIC GASTROPODA

BY

GEORGE L. KENNEDY

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Project Data Log was originally set up as a means of maintaining interest in the Western Society of Malacologists (WSM) while simultaneously producing a product for the Society that would be both meaningful and desirable to malacologists, professionals in peripheral fields, and shell collectors.

My past and continuing interest in trying to resolve anomalous distribution patterns of Pleistocene mollusks, which might have had some relationship to periods of upwelling in the past, led me to consider seasonal timing of reproduction as a possible correlative to seasonality of coastal upwelling. But as anyone knows who looks for published accounts of spawning or information on egg capsules, references are scattered widely throughout malacological and biological journals. Most of the published accounts are in papers whose titles do not even remotely suggest this content and are thus not easily retrievable even by trained bibliophiles. With this in mind, I considered it of great importance to compile and publish a list of previously unpublished occurrences. Because most of us at one time or another have seen gastropods spawning or associated with egg masses, who better to contribute to this project than the shell collector who, in the field, sees the living animals and can record these events? I know that the rarity of these observations is such that many of us take photographs (color slides) of spawning animals, or of egg capsules/egg masses; we may even have collected the specimen or taken notes on the occasion.

One of my earliest enthusiastic supporters of this project classified herself as a "rank amateur" at the time she photographed a spawning colony of *Acanthina spirata* on April 30 and May 1, 1934. Fifty years later, Dr. Myra Keen still had her notes and photographic prints and negatives of her early observations. One of these photographs (Figure 1) was shown during my talk on spawning records given at the 1985 WSM Annual Meeting in Santa Barbara. David Mulliner is presently making new black and white prints from these old negatives, two of which are shown here in Figures 2 and 3.

Fig. 1. *Acanthina spirata* (Blainville, 1832) spawning, May 1, 1934 (7 a.m.) Princeton Beach, Half Moon Bay, San Mateo Co., California.
Photograph by A. Myra Keen

The first compilation of spawning records will be issued under the title "Spawning records of eastern Pacific Gastropoda, I" in the WSM Annual Report, vol. 18, for 1985.

Eighteen records of 17 species from 12 families are represented in this list. Those who contributed records were Helen DuShane, Bill Pitt,

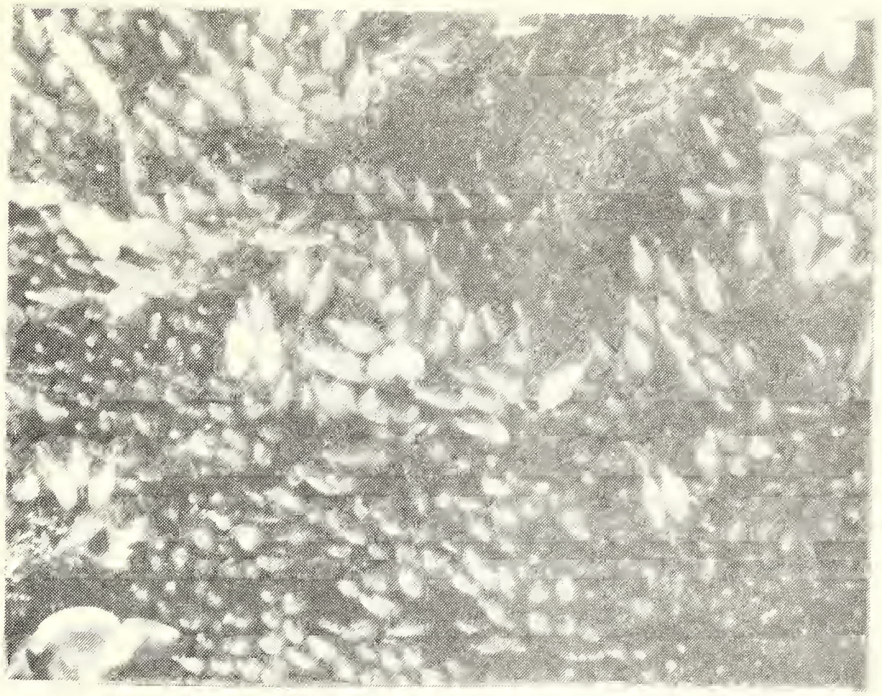

Fig. 2. Eggs of *Acanthina spirata* at Princeton Beach, Half Moon Bay, San Mateo Co., California, May 1, 1934 at 7:45 a.m. Photograph made by David K. Mulliner from a negative originally taken by A. Myra Keen.

Don Shasky, Myra Keen, and I.

Many of you reading this have observed spawning gastropods, and many have taken photographs. Your records are needed and they will continue to be published in the WSM Annual Report.

Project Data Log may sound like an ambitious project, but I believe that it is a worthwhile one. It is the intent of this project to see reference material, either slides or actual specimens, archived in a museum and available for posterity. To accomplish this, I will have duplicate slides made (if the originals are to be kept by the observer/collector) and will be responsible for compiling data records and keeping track of who has what. Any spawning information should be sent to me at the above address.

Fig. 3. *Acanthina spirata* crawling in an aquarium. 1934 (exact date not available). Photograph made by David K. Mulliner from a negative originally taken by A. Myra Keen.

NEW PUBLICATION

ILLUSTRATED CATALOGUE OF LATIAXIS AND ITS RELATED GROUPS
By Sadao Kosuge and Masaji Suzuki 1985
Institute of Malacology of Tokyo. Special Publication No. 1
83 pages, 24 color plates, 26 black and white plates
Published in Japanese and English
Price after publication: $20.00 postpaid

Sadao Kosuge and Masaji Suzuki have done a splendid work in this illustrated book. There are 24 photo color plates and a greater number of black and white plates. The especial beauty of this aesthetically attractive family is brought out in fine detail in the color photography. The black and white plates contain photographs of the types of numerous nominal species. There is a limited systematic treatment of all the species recognized by the authors with synonymies. A list of fossil species and one of species transferred to other families is also included along with an index. At $20.00 this book is within the reach of everyone interested in these beautiful shells.

This book is not a systematic monograph of the family, as the authors acknowledge, nor does it fulfill the claim to figure "all names ever given to living Coralliophilidae." It seems likely that some nominal species have been left out inadvertently at least. [A catalogue of primary references for all the then "known" species referable to this family with all applicable known generic taxa is that of D'Attilio (1978, Festivus 10(10):68-96).] An error in this publication attributing the taxa Coralliophilidae to Hoyle (1888) rather than Chenu (1857) was unfortunately repeated by Kosuge and Suzuki.

As the authors make clear in the Preface, the more than 200 species differ relatively little in shell morphology and a large proportion of the species live well below even scuba diving depths at 100 to 300 meters. Some species live in even more profound depths. Consequently, little or nothing is known of their biogeography, a fact applicable also to other Muricidae that have been studied. The authors state, in the third paragraph, that this catalogue of species is not really complete, but that "the illustrations are fully enough for collectors to identify recent [sic] species." Since the authors claim that this book does not pretend to be a systematic work, a critical review of their stated synonymies in the work need not be commented upon since some of Dr. Kosuge's own recently described taxa, as well as those of other authors, are junior synonyms.

Of especial interest are the large number of forms (morphotypes) of what the authors purport to be *Babelomurex spinosus* (Hirase, 1908). This taxon had been shown by D'Attilio (1983, The Festivus 15(1):2-4) to be the valid name for the numerous specimens exported from Japan with the name *Latiaxis pagodus* (A. Adams, 1853). However an examination of the photographs of the type of *Murex pagodus* A. Adams [courtesy of the British Museum (N.H.)] published in The Festivus demonstrates that this species differs specifically from *Babelomurex spinosus* (Hirase, 1908) [See Hirase 1908, Japanese Marine Mollusks, The Conchological Magazine 2(12):69-73, (English), pl. 42, figs. 253, 254.] There are 22 figures devoted to the *B. spinosus* complex in the authors' concept. The entire complex, as figured by Kosuge & Suzuki, was examined by this writer several years ago in a lot of 85 specimens said to have been collected in the Taiwan Straits and on loan at the time from Mr. Donald Pisor. The species from this area are very difficult to understand since at least four or five forms are very distinctive in their morphology and there is a lack of the genetic and biological knowledge necessary to arrive at a biological species concept. There are numerous forms that seemingly bridge the gap between the distinctive morphs. The immediate description of these forms could result, surely, in the creation of numerous synonyms. This is especially the case since quantitative characters are frequently mistaken for qualitative characters leading to endless arguments on synonymies.

In conclusion, the problem is that without any biogeographical data of consequence or genetic studies, the range of variation for the "species" cannot be known at this time or in the near future.

Anthony D'Attilio

COMMENTS ON CORALLIOPHILIDAE

BY

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I do not believe it amiss herein to mention a curious fact regarding the description of Coralliophilidae species and their generic characteristics. Though members of this family have no radula, in their shell morphology they are not different in any major respects from the family Muricidae. One of the major characters in the ontogeny of the shell of the Muricidae is the presence or lack of episodic growth.

Episodic growth is usually noted for the subfamilies Muricinae and Muricopsinae. On the other hand, some ocenebrine, thaid, and moruloid species demonstrate either varical (episodic) or non-varical growth. These two methods of growth are apparent in various genera of Coralliophilidae. Lack of episodic growth is most often associated with species referable, for example, to the genera *Mipus* and *Latiaxis* type species *Trophon gyratus* Hinds, 1884, and *Pyrula mawae* Griffith & Pidgeon, 1834, respectively. However, episodic growth is highly characteristic of *Babelomurex* type species *Fusus babelis* Requien, 1848, and closely associated genera.

In a paper written in The Festivus (D'Attilio 1981) I noted the evidence of episodic growth in two type species in *Babelomurex* (*Latiaxis sibogae* and *L. ricinuloides* both of Schepman, 1911). Since this factor had never been noted in any descriptive work on Coralliophilidae, to my knowledge, my thoughts remained equivocal concerning the presence of episodic growth in some genera of Coralliophilidae.

In subsequent studies (D'Attilio 1983; D'Attilio & Myers 1984) culminating in the description of *Babelomurex jeannae*, definite statements were made regarding episodic growth in Coralliophilidae. It is surprising that such an obvious morphological feature could have remained unnoticed for so long.

Literature Cited

D'ATTILIO, ANTHONY

1981. Two problematic coralliophilid gastropods. Festivus 13(2):16-20, 3 figs.

1983. Concerning the identity of *Murex pagodus* A. Adams, 1853. Festivus 15(1): 2-4, 9 figs.

______ & BARBARA W. MYERS

1984. Descriptions of five new muricacean gastropods and comments on two additional species, in the families Muricidae and Coralliophilidae: (Mollusca). Trans. San Diego Soc. Nat. Hist. 20(5):81-94, 34 figs.

DREDGING AT ITS PRIMITIVE BEST

OR

ROSEMARY'S 40 HOUR DREDGING TRIP

BY

HELEN DUSHANE

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If you were invited to go on a shell collecting trip among the islands at the mouth of the Golfo de Montijo, off the mainland of the Republic of Panama, would you accept knowing there would be no BED, BOARD, or BATH for 40 hours? Rosemary Adams* did and became a female Robinson Crusoe, existing with primitive methods in modern day times. This is the story of Rosemary's trip as she told it to me.

March 19, 1985-- Panama City, Republic of Panama--2 p.m. A good friend of long standing, Jimmy Ernest, called and wanted to know if I would like to go dredging for shells, with a little fishing thrown in, off a couple of the small islands in the Golfo de Montijo. At 10 p.m. that evening, Gladys (a Panamanian girl), Jimmy, and I drove north out of Panama City for about five hours to the mouth of the Rio de Jesus, which empties into the Golfo de Montijo. We arrived at 3 a.m. and his boat was waiting. A friend of his was ill so Jimmy took him to the hospital first. We lay down in the anchored launch and slept. About 7:30 a.m. Jimmy returned, and we took off for Isla Gobernadora (7°34'N, 81°12'W), a one and a half hour boat ride from the mouth of the Rio de Jesus. There we left some supplies at a native's home and picked up a Panamanian man and a teenage boy. The pilot was already on board. This made six people to be accommodated in a 20 foot launch. Only Jimmy and I spoke English.

The launch, or "lancha" as the Latinos call it, is a most efficient piece of equipment. The foredeck is covered to protect against high seas and a wooden roof midship protects against the sun. Ours was 20 feet long and a little over six feet across, but the tumblehome was not wide enough to lie down and stretch out crosswise. Because there were various pieces of equipment, it was impossible to lie down lengthwise. The one gasoline engine was attached to the stern, with a small thwart sternside on which the pilot sat. <u>There were no oars, no radio, and Panama has no Coast Guard</u>. The fish box (3 X 3 feet) was in the center. Food was stored in the fish box and consisted of crackers, cheese, bread, mangos, rice, potatoes, powdered milk liquified, cans of apricot juice, cookies and beef. I had taken peanut butter, crackers and a couple of apples, so I chose to eat that instead of most of the food in the box. There were no toilet facilities on board. Men went over the bow, and the women went over the stern end because it was lower and easier to use.

Dredging equipment consisted of a gasoline powered winch, three dredges and 200 feet of rope. Two of the dredges were of metal, with ¼ inch wire mesh; the third dredge had a metal frame with a ¼ inch nylon mesh bag. Each dredge was approximately three feet long by two feet wide and 12 inches deep. Two dredges were out at all times, with each drag being 15 minutes long. As the dredge was

*Rosemary Adams, a retired nurse from the American Hospital in Balboa, Republic of Panama, is an avid shell collector and has been on many collecting trips to the Perlas Islands. When her long time friend, Jimmy Ernest, invited her to put on her Panama hat and go dredging with him, it never occurred to her that she was in for a rare experience.

pulled up it was dumped on a square of canvas in the bow of the launch. Assorted shells, small stone fish, various species of crabs and sea urchins were in each dredge haul.

Off Isla Gobernadora, we dredged in 20 meters of water and brought up live specimens of *Murexiella lappa*, *Trophon carduus*, and *Distorsio constricta*, all three of (Broderip, 1833). We left Isla Gobernadora for Isla Cebaco (7°32'N, 81°09'W) situated south of the Golfo de Veraguas and north of the Golfo de Boca Vieja. It is one of hundreds of small uninhabited islands off the mainland of the Republic of Panama. We arrived at noon and dredged until dusk (about 7:30 p.m.) at depths of four to 20 meters. In our first dredge haul (from a sand substrate in 4 to 12 meters of water), we pulled up many large beautiful, live specimens from a colony of dark brown *Oliva spicata* (Röding, 1798). This color form is sometimes referred to as *O. fuscata* Marrat in Sowerby, 1870. Jimmy was delighted since he has many calls for this species.

That night we anchored in a small, protected cove and slept. Two people slept crosswise in front of the fish box, two slept crosswise behind the fish box and two slept on top of the fish box. Between one and two a.m. we pulled anchor and went an hour away to reach the fishing area. We fished two to three hours until sunrise. Red snapper which was common, bonita, and various other fish that were marketable comprised the catch. No fishing rods were used, instead the baited line was thrown out and pulled in by hand.

About 6 a.m. we returned to the dredging area and in 10 meters pulled up small but very clean specimens of *Muricanthus callidinus* Berry, 1958; *Cymatium vestitum* (Hinds, 1844), live and with their wolly periostracum intact; *Cancellaria ovata* Sowerby, 1832; and *Persicula tessellata* (Lamarck, 1822) only recently recognized in the eastern Pacific as an Indo-Pacific migrant. At 20 meters, from silty mud, came live specimens of *Polystira picta* (Reeve, 1843, ex Beck MS) and *Polystira oxytropis* (Sowerby, 1834). In the various dredge hauls were also more than 50 species of many common mollusks, not necessary to list here. Surprisingly, only four bivalve species, all juveniles, were taken.

At 2 p.m. Jimmy announced that we would all go ashore and cook something to eat. A fire was built and rice, potatoes and beef were cooked. Never did food taste so good! This was the first real meal we had had in 31½ hours! We returned to the dredging area and continued working until dark. By this time I was hoping that soon we would return to home base. Not so. We fished again until 9 p.m. and then returned to Isla Gobernadora arriving at 10 p.m.--40 hours from the time we started.

After eight hours sleep we returned to the launch to repeat another 40 hour trip!!

DUES ARE DUE

Club dues for 1986 are payable now. Single membership: $10.00; Family membership: $12.00; Overseas (surface mail): $12.00. Please make checks payable to the San Diego Shell Club and either pay treasurer Nola Michel at the January meeting or send to the Club address.

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MEMBERSHIP AND SUBSCRIPTION
Annual dues are payable to San Diego Shell Club. Single member: $10.00; Family membership: $12.00 Overseas (surface mail): $12.00 Address all correspondence to the San Diego Shell Club, Inc., c/o 3883 Mt. Blackburn Ave., San Diego, CA 92111 Single copies of this issue: $5.00. Postage is additional.

Meeting date: third Thursday, 7:30 P.M. Room 104, Casa Del Prado, Balboa Park

The Festivus is published monthly except December. The publication date appears on the masthead above.

PROGRAM

Greg Hamann, who has made twelve trips to the Caribbean collecting shells, will speak on "Shelling in the Caribbean." He will emphasize cone shells and will have slides of live cones as well as a display of twenty different species of cones (and a few unknown ones) from some of the Caribbean countries he visited.

Meeting date: 20 February

CONTENTS

NEW PUBLICATION

Aspects of the Morphology of the Endemic South African Cypraeidae with a Discussion of the Evolution of the Cypraeacea and Lamellariacea
By Terrence M. Gosliner & William R. Liltved August 1985
Annals of the South African Museum Volume 96, Part 4
55 pages, 35 figures (8 color photos of endemic species), 1 table

Annals of the South African Museum are professional monographs and are issued at irregular intervals as material becomes available. The 1985 monograph by Gosliner and Liltved studies aspects of the morphology of eight extremely rare endemic species of South African Cypraeidae, and discusses the variability of various characters within the family. The paper contains the most complete descriptions that have been published on *Cypraea fuscorubra, C. algoensis, C. coronata, C. fuscodentata, C. capensis, C. edentula, C. cruickshanki,* and *C. iutsui.* Habitat, shell, animal, mantle complex, digestive system, central nervous system, reproductive system, and radulae of the several species are compared. Excellent color photos show five of the species; black and white photos show dorsal, ventral and lateral aspects of all eight species. Careful anatomical drawings of features such as digestive tract, central nervous system, and reproductive system are presented. Drawings of radula teeth, in standard arrangement, indicate large differences among the eight species. Unfortunately, the scanning electron microscope photographs of radulae were made from various viewing angles, and therefore produced various distortions in tooth shapes and curvatures.

The authors devote several pages to the systematics of endemic South African Cypraeidae; they note that the taxonomy "...has historically been a source of considerable confusion, and this situation persists." The situation is particularly troublesome since several species show direct development without a free-swimming veliger stage. The eggs are generally laid on the undersurface of rocks and are brooded by the female. After the juvenile emerges from the egg capsule it is not likely to be carried a large distance by ocean currents. Therefore, populations along the coast can be isolated enough to develop significant genetic differences. For example, Gosliner and Liltved note that *Cypraea algoensis* collected along the Atlantic coast of the Cape Peninsula is consistently very different from the same species collected between False Bay and Cape Agulhas. They state that shells of the Atlantic specimens have a flesh or orange ground color with fine brown dorsal spotting, while the False Bay/Cape Agulhas shells may be dark purple with dark brown dorsal spots. Color photos show this striking difference.

This situation underscores the ever-present questions: what identifies a species: What are "significant genetic differences?" One criterion of species difference is whether fertile hybrids can be produced; such investigations would require efforts so great that they are unlikely to be pursued except in a very few cases. Each member of a population is genetically unique; what genetic characteristics should be chosen to distinguish different species? Even the most sophisticated methods of chromatography and biochemistry cannot give unambiguous answers. A researcher recently remarked that he obtained reasonably satisying results in chromatographic studies of speciation in Caribbean land snails only if he applied statistics to at least 100 specimens of each population, and used at least eight arbitrarily chosen genetic components.

Gosliner and Liltved state that "Lack of knowledge at present prevents the subdivision of *Cypraea* into monophyletic genera or subgenera." Nevertheless, this reviewer is greatly impressed by the amount of knowledge that is presented in the monograph. It is an important work for the professional who is interested in detailed studies of Cypraeidae, and for the collector who is interested in identifying South African cowries.

Hugh Bradner

MYRA KEEN, 1905-1986: AN APPRECIATION

BY

GENE COAN

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When I first visited Stanford University in 1962, where I later attended graduate school, I didn't know Myra Keen, and I was in awe of anyone who could personally know and have compiled so much information about mollusks. My heart beat rapidly as I climbed the two flights of stairs to the third floor of the old Geology Building. How would Dr. Keen treat me, an undergraduate student with a very limited knowledge of mollusks and only a half-formed desire to be a malacologist?

My concern about how I would be received was, of course, completely unnecessary, and she quickly put me at ease. Myra Keen was, above almost all else, highly skilled at making people feel appreciated. She was a master at it. To her, every person was to be treated with the greatest respect and patience. Needless to say, that visit proved decisive in the direction my life took for several years to come.

Other accounts to be published in the next few months will no doubt detail her many accomplishments. My purpose here is to point to some general themes about her contributions.

What many of us will remember most of all is her character. She gave individual attention to each person with whom she had contact -- both in person and in her thorough, carefully phrased letters. Her valuable criticisms and suggestions often had to be searched for between the lines of understated conversation and text.

She had a strength of character and determination seldom matched. No matter what the job -- from tasks of a magnitude that might have discouraged Sisyphus to routine correspondence from those who should have known better than to trouble her about trivia -- her approach was the same: a serene resolve to do the best job possible with the tools at hand -- and to do this day after day, month after month, until the job was done.

The role of synthesizer and compiler is not as popular these days as it has been in the past. Professional acceptance and advancement now seem to demand specific contributions to knowledge using fashionable techniques. Yet, great compilations, such as those for which Myra Keen is deservedly famous, serve to advance science in many, sometimes unappreciated ways: (1) to make such information available to a diverse audience and to provide entree into more detailed literature; (2) to facilitate identification of material, both by those whose central interest is mollusks and by those whose chief interests lie elsewhere; (3) to pose an array of unresolved questions to catalyze investigation and to challenge potential contributers to knowledge, both professional and amateur; (4) to provide data for ecological and biogeographical analysis and comparison; and (5) to popularize scientific information, thereby helping to establish the constituency and public acceptance so essential in ensuring adequate funding and recognition for malacological institutions and researchers.

We cannot ignore her major contributions to specific groups that set precedents for their time -- the Vermetidae, the Cardiidae, Juliidae, Typhinae, and the many groups on which she prepared manuscripts for the Treatise on Invertebrate Paleontology. She had formidable patience and thoroughness in working out long-ignored nomenclatural problems, laying many such difficult questions to a final rest.

All the ways she touched the lives of so many of us -- her unwavering kindness and strength of character, her major compilations, and her contributions to our knowledge of certain groups -- ensure her an enduring place in the history of malacology.

Editor's note: Photo and original slide by David K. Mulliner -- Dr. Keen at WSM meeting at Redlands, June 1982.

THE FAMILY BARLEEIDAE IN THE EASTERN PACIFIC ACCORDING TO THE "REVIEW OF THE GENERA OF THE BARLEEIDAE..." BY W.F. PONDER (1983)

BY

BERTRAM C. DRAPER

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In this listing, I have attempted to include all changes in the taxonomic placement of species assigned to the family Barleeidae in the eastern Pacific based on Ponder's (1983) "Review of the Genera of the Barleeidae (Mollusca: Gastropoda: Rissoacea)," and including a number of changes from other publications such as Abbott (1974) and Palmer (1958). A list of the literature from which this information was compiled is given at the end of this paper. After each entry in the list I have given the distribution, original genus where different, and notes on the synonyms with their authority.

Family BARLEEIDAE Gray, 1857
- Subfamily Barleeinae Thiele, 1925
  - Genus *Barleeia* Clark, 1853
    - *B. acuta* (Carpenter, 1857) - British Columbia to central west coast of Baja California. [=*B. dalli* Bartsch, 1920 (per McLean 1978), =*Diala marmorea* Carpenter, 1864, later moved to *Barleeia marmorea* and put in synonymy by McLean (1978). Ponder in 1967 placed *B. acuta* in subgenus *Pseudodiala* but put it in *Barleeia* in Ponder (1983)]
    - *B. alderi* (Carpenter, 1857) - Gulf of California. [Originally described as *Jeffreysia alderi*]
    - *B. bentleyi* Bartsch, 1920 - Southern California to Cabo San Lucas, Baja California Sur
    - *B. bifasciata* (Carpenter, 1857) - Mazatlan and Gulf of California. [Originally described as *Rissoella bifasciata*, then as *Jeffreysia bifasciata* both by Carpenter]
    - *B. californica* Bartsch, 1920 - Southern California
    - *B. carpenteri* Bartsch, 1920 - Cabo San Lucas, Baja California Sur
    - *B. coronadoensis* Bartsch, 1920 - Southern California to central west coast of Baja California
    - *B. haliotiphila* Carpenter, 1864 - Central California to west coast of Baja California
    - *B. oldroydi* Bartsch, 1920 - British Columbia to west coast of Baja California
    - *B. orcutti* Bartsch, 1920 - Central west coast of Baja California and Gulf of California
    - *B. paupercula* (C.B. Adams, 1852) - Panama [Originally described as *Cingula paupercula*; =*Barleeia zeteki* Strong & Hertlein, 1939 also from Panama]
    - *B. polychroma* de Folin, 1870 - Panama [Originally described as a *Rissoa*, this species has only been mentioned recently by one author, Keen (1971), and no collecting records have been published]
    - *B. sanjuanensis* Bartsch, 1920 - Puget Sound, Washington and San Juan Islands
    - *B. subtenuis* Carpenter, 1864 - Southern California to central west coast of Baja California
    - *B. subtenuis rimata* Carpenter, 1864 - Southern California [Validity of this subspecies is questionable]

Genus *Lirobarleeia* Ponder, 1983

L. clarionensis (Bartsch, 1911) - Gulf of California. [Originally described as *Alvania clarionensis*]

L. electrina (Carpenter, 1864) - Cabo San Lucas. [Originally described as *Alvania electrina*]

L. galapagensis (Bartsch, 1911) - Galapagos Islands. [Originally described as *Alvania galapagensis; =Alvania nigrescens* Bartsch & Rehder, 1939]

L. granti (Strong, 1938) - Gulf of California. [Originally described as *Alvania granti; =Alvania veleronis* Hertlein & Strong, 1939 from Panama]

L. hartmanni (Jordan, 1936) - Pleistocene from California

L. herrarae (Baker, Hanna & Strong, 1930) - Southern Gulf of California. [Originally described as *Alvania herrarae*]

L. hoodensis (Bartsch, 1911) - Galapagos Islands. [Originally described as *Alvania hoodensis*]

L. ingrami (Hertlein & Strong, 1951) - Port Guatulco, Mexico. [Originally described as *"Alvania? ingrami"*]

L. kelseyi (Dall & Bartsch, 1902) - San Pedro, California to Coronado Islands. [Originally described as *Rissoa kelseyi; =Alaba oldroydi* Dall, 1905; *Rissoina lapazana* Bartsch, 1915; *Alvania bartolomensis* Bartsch, 1917; *Rissoina lowei* Strong, 1938]

L. lara (Bartsch, 1911) - Galapagos Islands. [Originally described as *Alvania lara*]

L. lirata (Carpenter, 1857) - Mazatlan. [Originally described as ?*Rissoa lirata*]

L. nemo (Bartsch, 1911) - Galapagos Islands. [Originally described as *Alvania nemo*]

L. perlata (Mörch, 1860) - El Salvador. [Originally described as *Alvania perlata*]

[One species mentioned by Ponder (1983) under *Lirobarleeia, ?Turbella cowlitzensis* Effinger, 1938, is for an Oligocene fossil species and is unlikely to be found as a Recent species.]

Subfamily Anabathroninae Coan, 1964

Genus *Anabathron* Fraunfeld, 1867

A. muriel Bartsch & Rehder, 1939 - Aleutian Islands

Subgenus *Scrobs* Watson, 1886

No species of this subgenus have been reported from the eastern Pacific.

Genus *Amphithalamus* Carpenter, 1864

A. inclusus Carpenter, 1864 - Central California to Panama [= *A. tenuis* Bartsch, 1911 from Southern California; *A. stephensae* Bartsch, 1927 from west coast of Baja California; *A. trosti* Strong & Hertlein, 1939 from Panama]

[Carpenter (1864) described ?*Amphithalamus lacunatus* from two dead specimens from San Pedro, California. This species has not been reported since.]

Literature Cited

ABBOTT, R. TUCKER

1974. American Seashells, 2nd ed., Van Nostrand Reinhold, NY, 663+pp.

CARPENTER, PHILIP P.

1857. Catalogue of the collection of Mazatlan shells in the British Museum... London. 552+ pp.

KEEN, A. MYRA

1971. Sea shells of tropical west America, 2nd ed. Stanford Univ. Press, Stanford, CA, 1064+ pp.

MCLEAN, JAMES H.

1978. Marine shells of southern California. Nat. Hist. Mus. of L.A. Col, Sci. ser. 24, rev. ed. 104 pp.

PALMER, KATHERINE VAN WINKLE
1958. Type specimens of marine Mollusca by P.P. Carpenter from the west coast(San Diego to British Columbia). Mem. Geol. Soc. America 76, 376 pp.
PONDER, WINSTON F.
1967. The classification of the Rissoidae and Orbitestellidae with descriptions of some new taxa. Trans. Roy. Soc. N.Z. 9(17):193-224.
1983. Review of the genera of the Barleeidae (Mollusca: Gastropoda: Rissoacea). Rec. Austral. Mus. 35:231-281.

EXCERPTS FROM THE 1986 TIDE CALENDAR FOR THE NORTHERN GULF OF CALIFORNIA

The entries listed here will show only periods of low tides of -4.0 feet and below. The tidal measurements, in this calendar prepared by The Department of Ecology and Evolutionary Biology, University of Arizona, are for Puerto Penasco and are given in Mountain Standard Time. To correct for San Felipe, subtract one hour from listed times (San Felipe is on Pacific Standard Time). For Bahia de Los Angeles, add 15-30 minutes to calendar predictions (the amplitude at Bahia de Los Angeles is about one-half of calendar measurements). Tides at Santa Rosalia and Guaymas cannot be estimated using this calendar. [Interpretation of tide calendar is approximate].

February
23. -4.8 at 7:45 P.M.
24. -5.0 at 8:10 P.M.
25. -4.2 at 9:00 P.M.

March
25. -3.9 at 7:45 A.M.
-4.2 at 8:00 P.M.
26. -4.5 at 8:10 A.M.
-3.9 at 8:30 P.M.
27. -5.0 at 8:30 A.M.
28. -4.9 at 9:00 A.M.
29. -3.9 at 9:30 A.M.

April
23. -4.1 at 7:00 A.M.
24. -5.5 at 7:30 A.M.
25. -5.9 at 8:00 A.M.
26. -4.8 at 8:45 A.M.
27. -3.9 at 9:15 A.M.

May
22. -4.1 at 6:30 A.M.
23. -5.0 at 7:00 A.M.
24. -5.3 at 7:50 A.M.
25. -4.0 at 9:30 A.M.

June
20. -3.9 at 6:00 A.M.
21. -4.5 at 6:30 A.M.
22. -4.2 at 7:30 A.M.
23. -4.0 at 8:00 A.M.

July
22. -4.0 at 8:30 A.M.

August
19. -4.0 at 7:45 A.M.
20. -4.0 at 8:15 A.M.

September - none

October
4. -4.0 at 8:10 P.M.

November
29. -4.0 at 6:10 P.M.
30. -4.5 at 6:30 P.M.

December
29. -4.2 at 6:30 P.M.
30. -5.5 at 7:00 P.M.
31. -5.8 at 7:50 P.M.

MICROSCOPIC OBSERVATIONS ON TWO SPECIES OF LATIAXIS S.S. (CORALLIOPHILIDAE CHENU, 1859)

BY

ANTHONY D'ATTILIO

Department of Marine Invertebrates, San Diego Natural History Museum, Balboa Park, P.O. Box 1390, San Diego, California 92112

In a recent paper [Festivus vol. 17(10):98-100], I examined the morphology of *Latiaxis pisori* D'Attilio & Emerson, 1980, excluding the embryonic shell or nucleus. Regardless of family or generic assignment, the nucleus, because of its thin fragile nature is usually lacking from nearly mature or mature specimens on most muricacean species. Evidence of the form of the nucleus must be sought in immature specimens which nonetheless show the configuration of the mature form.

Immature specimens of *Latiaxis pisori* (10mm H x 12.5 mm W) and *Latiaxis mawae* (Gray, in Griffith & Pidgeon, 1834) (20 mm H x 26 mm W) shown in Figures 1 and 2 respectively, were examined microscopically for the nature of the nucleus. The nucleus and first postnuclear whorls of both were drawn by means of camera lucida projections at 50X.

Generic affinity appears close in the two species. In both *L. pisori* and *L mawae* the nucleus arises out of the flattened surface of the teleoconch. However, as the teleoconch develops, each whorl though flattened, descends more sharply in *L. pisori* than in *L. mawae*.

Latiaxis pisori has a nucleus of 2½ shiny light amber whorls, the last portion of which has fine axial ridges most prominent posteriorly; the first postnuclear whorl is followed by an axially undulated flattened whorl crossed vertically by fine growth ridges; spirally the surface is finely striate. The first whorl terminates in a rounded ridge of the same nature as the axial striae, including its undulating morphology. *L. mawae*, a larger species, has a nucleus of four whorls entirely smooth and of a pale amber color. The teleoconch starts very strongly from the terminal ridge of the nucleus with a series of axial ridges and is undulate spirally midway to the ridge defining the nucleus. It is strongly, axially striate as in *L. pisori* but lacks the fine incised spiral lines apparent in that species.

The surface of *L. mawae* is smooth, minutely transversely scabrous, and the final portion of growth is detached from the shell to a marked degree at full maturity. The surface of *L. pisori* is more coarsely, transversely scabrous; the whorls are more or less strongly undulate axially; two spiral ridges are present, generally one below the juncture of the aperture posteriorly and one well below this at the anterior end of the body whorl above the broadly open canal. In addition, the final portion of the body whorl differs in not being detached as in *L. mawae*.

An examination of the scabrously edged siphonal fasciole of *L. pisori* shows, in this 3½ whorled immature specimen, nine scale-like canal terminations. These earlier canal terminations may indicate that growth occurs in very short spurts with the varical margins entirely resorbed. The specimen of *L. mawae*, although immature with only 2½ postnuclear whorls, is of larger size and has a scabrous fasciole with only five well developed remnants of previous siphonal canal terminations.

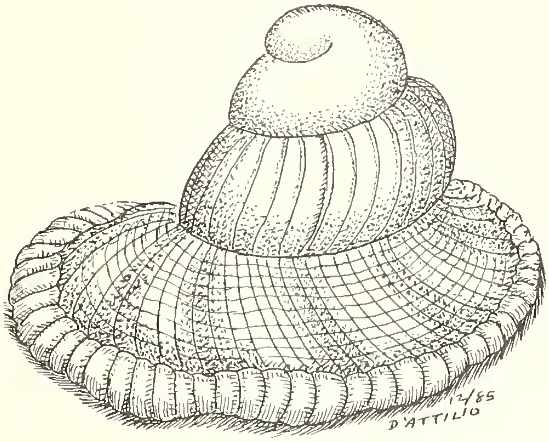

Fig. 1. Protoconch of *Latiaxis pisori* at 50X. Height of shell, 10 mm. Width of shell, 12.5 mm.

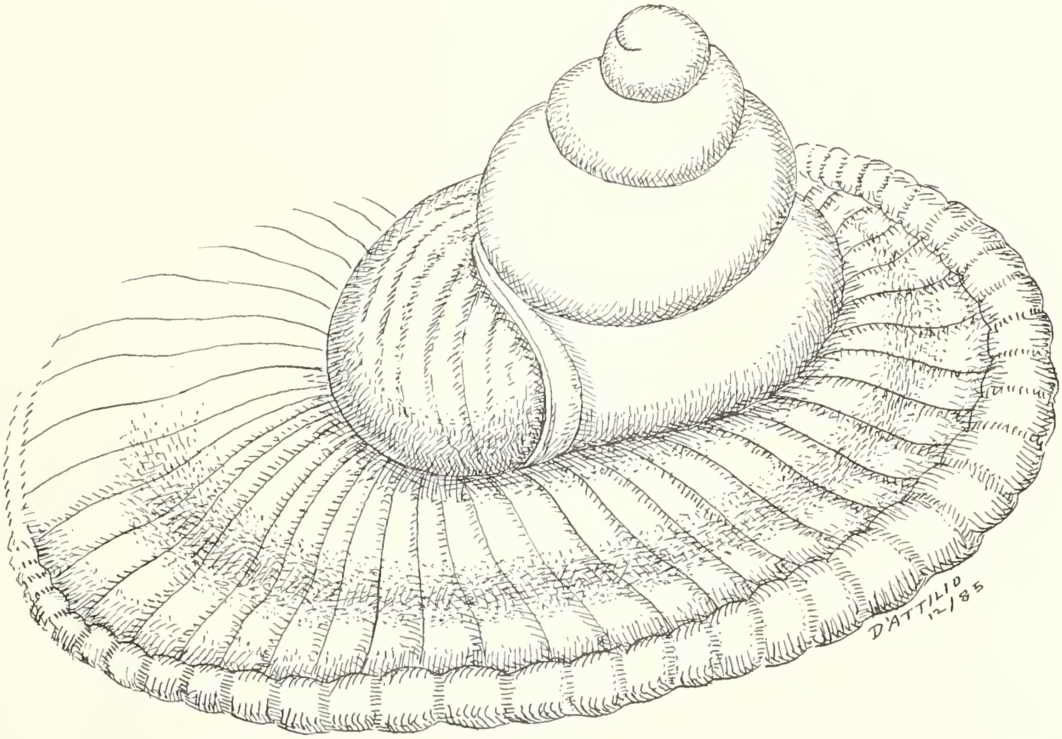

Fig. 2. Protoconch of *Latiaxis mawae* at 50X. Height of shell, 20 mm. Width of shell 26 mm.

CROSSLANDIA DAEDALI POORMAN & MULLINER, 1981

BY

LEROY H. POORMAN

15300 Magnolia Street #55, Westminster, California 92683

The following is extracted from an unpublished manuscript and the species is figured for the first time.

In July and September 1901, a Mr. Crossland collected four specimens of a bright green nudibranch from the young leaves of *Zostera* along the coast of Zanzibar. Sir Charles Eliot, K.C.M.B., Commisioner and Counsul-General in the British Protectorate of East Africa, described *Crosslandia viridis gen. et spec. nov.*, in 1902 [Proc. Zool. Soc. London 2:62-72] based on the four specimens. One of the four showed marked peculiarities. For this, Eliot proposed the taxon *C. fusca*; but he synonymized this with *C. viridis* in 1908 [J. Linn. Soc. Zool. London 31:86-122]. Since 1902, there have been several additional reports, widely separated geographically, of animals which fall into this genus, and probably this species. *C. orientalis* Thiele is a synonym.

Natural History of *Crosslandia daedali* Poorman & Mulliner, 1981

Members of this species are active nudibranchs living intertidally on marine algae such as *Zostera* and *Padina*. The animals prefer turbulent water where they move about from branch to branch with their lateral lobes extended to give maximum exposure to the branchia. When exposed by the receding tide, they have been observed to move under the protection of exposed algae and to reduce body size to a gelatinous mass. Several specimens have been found in cracks in rocks in full sunlight and well above the water level. When removed to an aquarium, the animals resumed normal shape and lived on *Padina* in a typical manner.

Crosslandia daedali (Figure 1) consume small hydroids growing on the *Padina*. They graze slowly over the surface or attach to the edge of a frond with a small central portion of the foot and remain at rest with the head and neck extended and the lateral lobes projecting at an angle of 45° from the vertical. As a result of their coloring and shape, the animals are perfectly camouflaged, resembling pieces of torn algae.

The species is not free-swimming. When specimens were placed on the surface in an aquarium, they sank to the bottom in an inverted position. They undulated their bodies and maintained some neutral

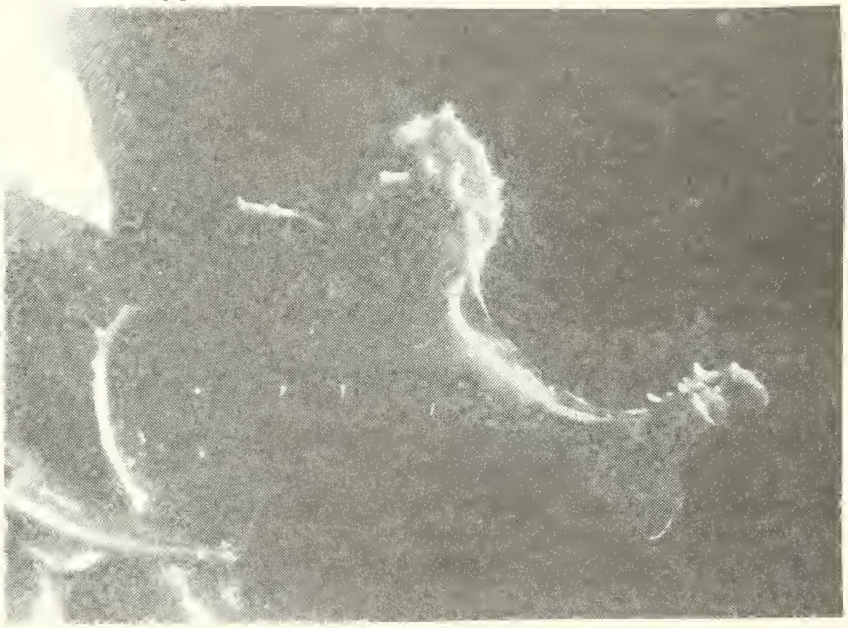

Fig. 1. *Crosslandia daedali* Poorman & Mulliner X2

buoyancy; but the lateral lobes were never involved and the animals settled rapidly when tired.

The first specimen of this species was found clinging to a leaf of *Padina* at Tinajas, Bacochibampo Bay, Guaymas, Sonora, Mexico, 4 December 1975. Additional specimens were found there, at the south end of Algodones Bay and in the tide pools below the trailer park at San Carlos every year from 1975 to 1980. Then the rising water temperatures as a result of El Niño seemed to take their toll and no more specimens were found. During each year of this six-year period, specimens were kept in a salt water aquarium. They lived, copulated, and layed egg masses (Figure 2) as long as fresh *Padina* was provided.

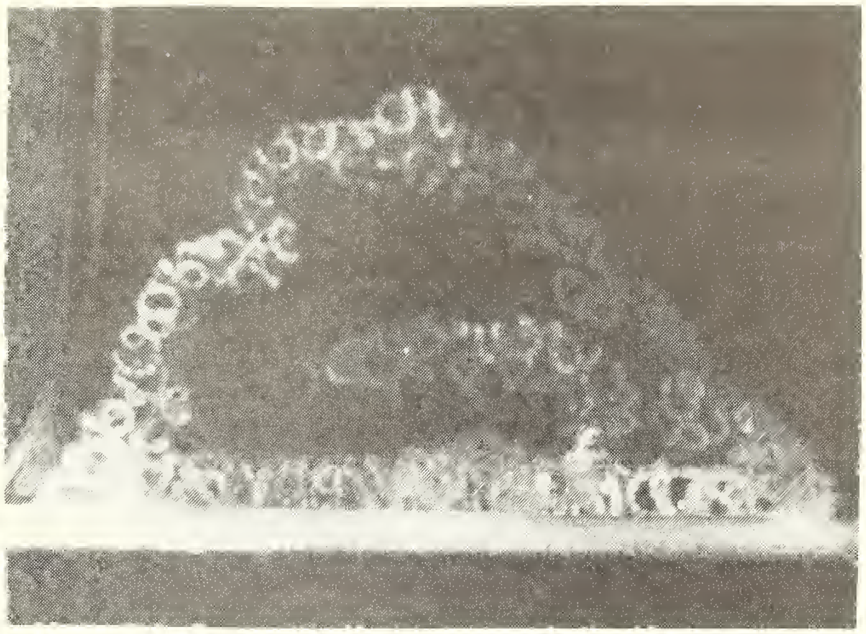

Fig. 2. Egg mass of *C. daedali* on wall of aquarium X4

The genus, *Crosslandia,* has been reported from Zanzibar, the Red Sea, and Japan. The species, *C. daedali* Poorman & Mulliner, has been reported only from the Guaymas area [Nautilus 95(2):96-99].

CLUB NEWS

FROM THE MINUTES - SAN DIEGO SHELL CLUB MEETING - 16 JANUARY 1986

Our new Vice President, Wes Farmer, presented several interesting films on nudibranchs. The first, filmed near Punta Lobos, Sonora, Mexico, showed various nudibranchs in their natural environment. The second, produced by Hank Schroeder of Phoenix, showed *Coryphella cynara* Marcus & Marcus, 1967 swimming. The third film really caught the interest of the audience as we watched *Roboastra tigris* Farmer, 1970 pursuing and eating little *Tambja eliora* Marcus & Marcus, 1967, in an aquarium. The escape behavior of *Tambja* was, in may cases, successful in eluding its predator but the *Roboastra* proved to be relentless. The final film, an animated depiction of the swimming styles of various mollusks was accompanied by flip-cards of Wes' creation in the interesting display brought by him.

Business meeting: Richard Herrmann discussed the decreasing attendance in recent months. A phone committe to remind members was suggested as well as offers of carpools for those members needing transportation.

The Club will again participate in the Greater San Diego Science and Engineering Fair. The three Club judges for the April ninth judging will be Marty Schuler, Nola Michel, and Carole Hertz. Jules Hertz is the alternate.

Nola Michel was asked to purchase a new coffee pot for the Club.

The shell drawing was won by Carole Hertz and the cookies were supplied by Heidrun and Phil Faulconer.

Ginny Outwater

The individual party favors of shells prepared by the Bradners for the Club Christmas party were greatly appreciated by those who attended. The Bradners, who were unable to attend, were toasted for their thoughtfulness.

FOR YOUR INFORMATION

Volunteers are needed for Botanical Foundation representative and the phone committee. If you would like to help, contact President, Richard Herrmann (459-3317).

The Club committees for 1986 are:

Library: Margaret Mulliner and Barbara W. Myers
Host: Ian Hamilton
Parliamentarian: David K. Mulliner
Phone: Ian Hamilton (additional volunteers needed)
Botanical Garden Foundation rep.: (volunteer needed)

It has been suggested that some members "need a ride" in order to attend Club meetings. Since most members would be happy to help, those who need rides are asked to contact a board member so arrangements for carpools can be made.

Dues are due! For rates, see the first page of this issue. Make checks payable to the San Diego Shell Club, Inc. in care of the Club address or pay Treasurer, Nola Michel, at the February meeting.

The annual Club Auction and Potluck will be held at the home of Mary and Ron McPeak. The April date for this most enjoyable function will be announced at the February meeting. Our thanks to Mary and Ron for offering their home for this event. It is not too early to begin selecting shells for the auction. Either bring them to a meeting or make arrangements to get them to a board member. The auction is only as good as the shells that are donated.

THE FESTIVUS
A publication of the San Diego Shell Club

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MEMBERSHIP AND SUBSCRIPTION
Annual dues are payable to San Diego Shell Club. Single member: $10.00; Family membership: $12.00
Overseas (surface mail): $12.00
Address all correspondence to the San Diego Shell Club, Inc., c/o 3883 Mt. Blackburn Ave., San Diego, CA 92111
Single copies of this issue: $5.00. Postage is additional.

Meeting date: third Thursday, 7:30 P.M. Room 104, Casa Del Prado, Balboa Park

The Festivus is published monthly except December. The publication date appears on the masthead above.

PROGRAM

Cancellaria cooperi Parasitises the Pacific Electric Ray, *Torpedo californica*

John B. O'Sullivan of Scripps Institution of Oceanography will discuss this remarkable discovery first made with two other Scripps researchers while diving off San Diego. He will also talk on the laboratory studies which confirmed their findings. Films of this parasitic behavior will be part of Mr. O'Sullivan's presentation.

Meeting date: 20 March

CONTENTS

"DR. PILSBRY, YOUR REPLACEMENT HAS ARRIVED----"

Anyone in the military knows that relief from an undesirable situation usually is a l-o-o-o-ong time coming. The same, until now, has been true regarding the field of chitons (Polyplacophora).

In the years 1892 and 1893---ninety-two years ago---Dr. Henry Pilsbry's masterly study on the chitons of the world was published by the Academy of Natural Sciences of Philadelphia as volumes XIV and XV (part) of Tryon and Pilsbry's monumental Manual of Conchology. While since then many papers and studies of limited scope have appeared, these have served both (1) to expand and somewhat redefine the structure and species of the Polyplacophora ---and (2) with their varying and often conflicting findings, concomitantly to broaden and heighten a growing confusion. But now, the just-released initial volumes of Kaas & Van Belle's Monograph of the Living Chitons demonstrate that relief is definitely at hand.

To date two volumes (of a contemplated eight or nine) have been issued. Volume I, "Order Neoloricata: Lepidopleurina," (240 pages, 95 figures, 45 maps) covers the Families Leptochitonidae, Hanleyidae, and Afossochitonidae. Volume II, "Suborder Ischnochitonina --- Ischnochitonidae: Schizoplacinae, Callochitoninae and Lepidochitoninae," (198 pages, 76 figures, 40 maps) covers subfamilies of the Ischnochitonidae as listed in the title. Volume III, not yet issued, will cover further subfamilies of the Ischnochitonidae.

In every aspect the coverage is extremely thorough. For each genus the type species and principal synonyms are given, with pertinent authors and dates. For each species and for all its principal synonyms, the author, date and publication are given, followed by a detailed description of the species, an excellent set of pen-and-ink illustrations, a map of the geographic distribution of the species, and for species of complicated synonymy a discussion clarifying selection of the preferred species name. An extensive bibliography and a clearly arranged index top off a highly impressive publication.

As in any study of such scope, questions are bound to arise. For instance the multiple synonymy assigned in some species will probably raise a few eyebrows; however the accompanying discussions afford either a basis for agreement or, contrariwise, a definite point of departure for differing opinions. The pen-and-ink illustrations are excellent, and far superior to any but the very best---and forbiddingly expensive! --- photography. Furthermore the 171 numbered "figures" are more like plates in that they each are composed of several sub-figures, so that the grand total actually is well over 1500 individual illustrations, a most comprehensive coverage.

The publisher is E.J. Brill, of Leiden, The Netherlands. The books are hardbound, and paper and printing are of fine quality. The cost, postpaid, is about $34.00 for Volume I and $39.00 for Volume II; they are available in the United States through E.J. Brill, c/o Expediters of the Printed Word Ltd, P.O. Box 1305, Long Island City, NY, 11101.

If your interest lies in or touches on the Polyplacophora, I am sure you will want this entire study in your library.

George A. Hanselman

HERBERT NELSON LOWE 1880-1936

A GIFTED AMATEUR CONCHOLOGIST FROM SOUTHERN CALIFORNIA

BY

CAROLE M. HERTZ

Department of Marine Invertebrates, San Diego Natural History Museum, Balboa Park, P.O. Box 1390, San Diego, California 92112

ABSTRACT. H.N. Lowe published 26 papers; 19 on his own, six with H.A. Pilsbry, and one with A.M. Strong. He named 37 species on his own and 130 with Pilsbry. This paper provides a list of the taxa named by him alone and with Pilsbry, listing the repositories of the types, type numbers and, when known, the number of specimens in the type lots. A lectotype designation is made herein for *Fusinus sonoraensis* Lowe, 1935.

A bibliography of Lowe's work, an index to the species named by him, and background information on his life are included.

Herbert Nelson Lowe (Figure 1) was a collector and author who named 167 molluscan species both terrestrial and marine. He deserves to be better known today both to collectors and workers in malacology— especially to students of the southern Californian and Panamic faunas.

It was as a result of his generous bequest to the San Diego Natural History Museum of his large malacological library and vast shell collection (with an endowment for its upkeep) that the Conchology Department (as it was then called) of the Museum achieved prominence. Lowe's only condition was that his collection be known as the Herbert N. Lowe Conchological Collection.

Fig. 1. H.N. Lowe (center), undated photo, SDNHM archives

The San Diego Union of June 30, 1936 stated. "What is believed to be the largest private collection of shells in America has been bequeathed to the San Diego Society of Natural History together with a $25,000 endowment for its maintenance...." The San Diego Tribune of that same date said of the collection that it contained "upward of 10,000 species and many times that number of individual shells." Clinton G. Abbott, director of the Museum at the time, said of the collection that "...all the specimens [are] beautifully arranged and scientifically catalogued in the Lowe private museum in Long Beach." Figures 2 and 3 are photographs of Lowe's private museum. Abbott

Fig. 2. Interior of Lowe's "private museum" SDNHM archives

added that "Mr. Lowe had done more field work along the coast of North and South America than any other conchologist."

Herbert Nelson Lowe was born in Minnesota in 1880. His family moved to California when he was about seven years old and after spending time in Oakland, Santa Barbara, and Pasadena moved, in 1899, to the vicinity of Long Beach. They "bought a small tract of land in what was then the outskirts of Long Beach and started a nursery which later grew into an extensive florists business (Figure 4). With the growth of the city, this land became part of a high class apartment house district" (Strong & Chace 1936).

The young boy became interested in shells early. In fact his first paper, written for the "Transactions of the Isaac Lea Conchological Chapter" in 1894 when he was about 14 years old (Figure 5) was published in The Nautilus the following year. Called "My First Year Collecting and Studying Shells," the short article advises the reader that the author had "only studied conchology for about a year" and had "quite a limited" knowledge of shells. He enthusiastically described the intertidal mollusks he saw in the Long Beach and San Pedro areas, and this early paper showed him to be a keen observer.

During this time he did "study" conchology, attending a Conchology class at the Chatauqua Assembly taught by Professor Josiah Keep, (Strong & Chace 1936) known for his book WEST COAST SHELLS (first published in 1887 and the only comprehensive book on west coast mollusks at the time).

By 1912 he was listed in Maxwell Smith's THE INTERNATIONAL DIRECTORY OF

Fig. 3. Entrance to Lowe's private museum

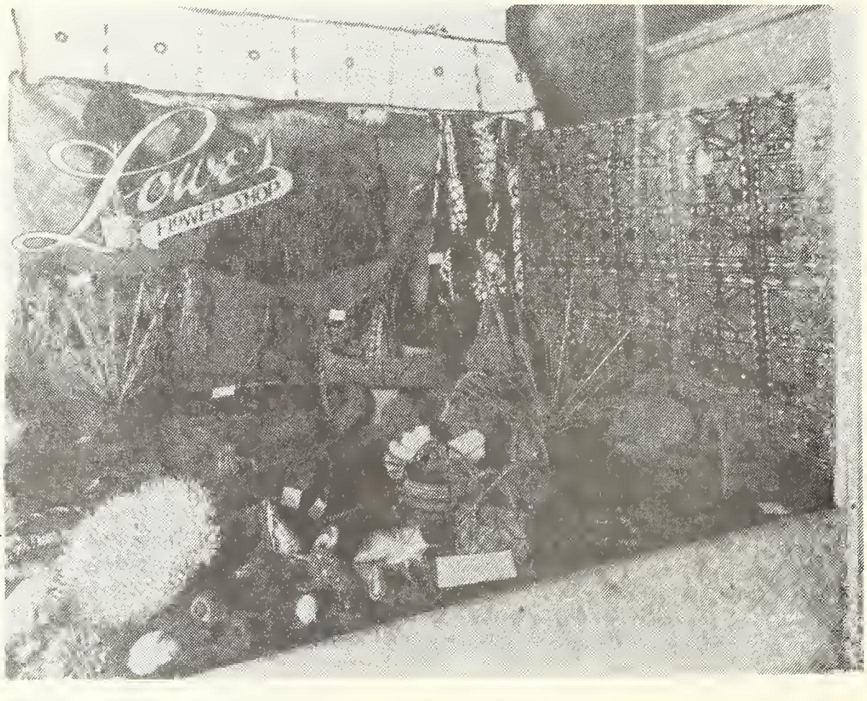

Fig. 4. Lowe's Flower Shop at 220 West Ocean Ave., Long Beach, California

MALACOLOGISTS AND CONCHOLOGISTS. In the 1914 edition he was listed on page 7 as follows:

1896 *H.N. Lowe 238 Junipero Ave, Long Beach, Cal [* referred to a member desiring to exchange shells, date indicating the first year of interest in conchology].
He had already published five papers in The Nautilus and had taken his first trip to the west coast of Baja California in "the staunch little power yacht 'Flyer'" with a crew of three and "the owner of the boat, the taxidermist, the tourist, the ornithologist and the conchologist [Lowe]." It was a month's cruise in which he collected both land and marine mollusks on the west Mexican coast and the islands offshore including San Martin, San Geronimo, Guadalupe, and Cedros (Lowe 1913).

Fig. 5. H.N. Lowe in photograph dated April 1892

In 1916, he traveled with his mother through Yosemite and the Sierra Nevada in their "Buick Six" camping and collecting land snails (Lowe 1916). After his mother's death, about 1925, Lowe spent most of his time on his shells; traveling to Europe, the south seas, Cuba, and Florida; visiting museums and collectors; and building up his collection (Strong & Chace 1936, Pilsbry 1927, 1928 and Hand 1926).

In the early 1930s Lowe started to concentrate on Mexican and Central American travel and collecting. It was to be his area of specialty for the rest of his life, and the work he did on the mollusks of the Panamic Province comprise his most valuable contributions. His trips were by sea and land, and he seemed to relish the rugged and sometimes hazardous nature of his journeys. His descriptions of the road trips to San Felipe and Puerto Peñasco in the northern Gulf of California (Lowe 1933a,b and 1934a,b) would have been enough to dissuade all but the hardiest travelers. His reports on these two areas give present day enthusiasts an idea of what these rather modern places were like in their romantic early days, as well as providing information on the mollusks and their ecology. In these reports, ten new species were proposed (Lowe 1935).

A note in The Nautilus in April 1930 was written by Mr. Lowe from Mazatlán during one of his visits. The three-page letter is entertaining. To read of finding *Malea ringens* intertidally under rocks at Venado Island is rather startling to someone who has only collected in that depleted area in recent years. His closing paragraph gives an indication of the pleasure this man derived from his avocation.

> "A small point of rocks in the inner bay, near 'Campo Santo,' last year at this time yielded some of my choicest treasures— Mitras, several fine species of *Pleurotoma* and the beautiful *Murex lappa* Brod. This year the hermit crabs had changed their fashions in wearing apparel and nothing more elaborate than Cerithiums were to be seen. It simply wasn't being done this season in the best society of Mazatlan crabs."

In the early 1930s, Lowe traveled to places like Puerto Libertad, Sonora, Mexico (Figure 6); Champerico, Guatemala; La Union, El Salvador; San Juan del Sur, Nicaragua; Santa Elena, Ecuador; and Bahía Montijo, Panama by whatever means were

available—auto, railroad, steamer, small launch, horseback, and dugout canoe. He lived with local families, or in little hotels, or camped (Lowe 1932). The amount of material he collected on these trips is staggering and much of it was new to science. Figure 7 is of Lowe on a collecting trip to Punta Peñasco.

Lowe knew and had actively corresponded with Dr. Henry A. Pilsbry, then the leading malacologist in this country. Dr. Pilsbry was curator of mollusks at the Academy of Natural Sciences of Philadelphia and editor of The Nautilus.

Fig. 6. H.N. Lowe and Papago Indian woman at Puerto Libertad, in February 1935. Original photo by L.M. Huey, SDNHM archives.

In the archives of the San Diego Natural History Museum are letters from Dr. Pilsbry to H.N. Lowe as early as May 28, 1896. This first letter instructed the young Lowe in the preparation of "slugs" which Lowe was intending to send to Dr. Pilsbry. In it Pilsbry agreed to identify "any Californian (or U.S.) shells you may wish, free of expense" keeping any duplicates and returning the rest "at yr. expense." He added that he would charge "10¢ pr species" for foreign shells or he would be "swamped by collectors." The letters continue through May 1934 and indicate the value Lowe placed on the friendship since he saved them, a couple of which were received in far off places such as Corinto, Nicaragua, throughout his lifetime. The letter sent to him in Nicaragua (Jan. 19, 1931) explained the taxonomic muddle concerning *Fusinus cinereus* (Reeve) which Lowe incorporated in his 1935 paper.

With Pilsbry, Lowe worked on the material he'd collected in Mexico and Central America during his first three expeditions, and together they published the 1932 paper, "West Mexican

Fig. 7. H.N. Lowe on a collecting trip to Puerto Peñasco, Sonora, Mexico

and Central American Mollusks Collected by H.N. Lowe, 1923-31." A letter from Pilsbry in October 1931 referred to this as "the big paper." It contains an annotated list of the species collected, together with the description and illustration of 125 new species and subspecies. Most of this type material is at the Academy of Natural Sciences of Philadelphia. The taxa are discussed by Clench & Turner (1962).

Lowe made several later trips to Mexico after the publication of this major work. He traveled on some with staff mambers of the San Diego Natural History Museum and co-sponsored, with the Museum, a six week scientific expedition to Sonora, Mexico. He invited a "talented" high school boy to go along on this trip at his expense (The San Diego Evening Tribune, Jan. 23, 1935).

On June 10, 1936 he died (Pilsbry 1936) "after a short illness at the height of his activity" (San Diego Union, June 30, 1936), and his collection was prepared for shipment to the San Diego Natural History Museum. It took three large vans to transport his specimens, cases, and books (San Diego Union, Feb. 4, 1937).

The treasure of H.N. Lowe's shell collection is still differentiated in the Museum collection by its special labels. Many of the species he collected are significant historically; many collecting areas no longer exist, many of the species are no longer found in those areas that still do exist, and his type material is invaluable to researchers.

SPECIES NAMED IN HONOR OF H.N. LOWE

Argyrotheca lowei Hertlein & Grant, 1934 [brachiopod]
Clathurella lowei Dall, 1903
Cyclostrema lowei Baker, 1930
Dallspira lowei Bartsch, 1950
Euglandina lowei Pilsbry, 1931
Eulima lowei Vanatta, 1899
Mitra loweana Pilsbry, 1931
Mitra lowei Dall, 1923
Monodenia mormonum loweana Pilsbry, 1926
Mopalia lowei Pilsbry, 1918
Pecten (Chlamys) lowei Hertlein, 1935
Pleurodonte (Caracolus) lowei Pilsbry, 1929
Polygyra loricata lowei Pilsbry, 1925
Scala lowei Dall, 1906
Subulina lowei Pilsbry, 1919
Trachydermon lowei Pilsbry, 1918
Turbonilla (Pyrgolampros) lowei Dall & Bartsch, 1903
Typhis lowei Pilsbry in Pilsbry & Lowe, 1932
Urocoptis lowei Torre & Pilsbry, 1927
Volvulella lowei Hertlein & Strong, 1937

GENERA AND SUBGENERA DESCRIBED BY PILSBRY & LOWE

The only genera proposed by Lowe were as coauthor with Pilsbry. The eight genera and their type species are listed below with the page numbers in Pilsbry & Lowe, 1932c.

Brephodrillia	*Brephodrillia perfectus* Pilsbry & Lowe, 1932	47
Cacodaphnella	*Cacodaphnella delgada* Pilsbry & Lowe, 1932	58
Glyptanachis	*Anachis (Glyptanachis) hilli* Pilsbry & Lowe, 1932	73
Microtrypetes	*Terebra (Microtrypetes) iola* Pilsbry & Lowe, 1932	43
Neoteron	*Hindsia ariel* Pilsbry & Lowe, 1932	67
Steironepion	*"Mangelia" (Steironepion) melanosticta* Pilsbry & Lowe, 1932	57
Tripterotyphis	*Typhis lowei* Pilsbry in Pilsbry & Lowe, 1932	78
Zanassarina	*Nassarina poecila* Pilsbry & Lowe, 1932	75

SPECIES PROPOSED BY H.N. LOWE

The species described by Lowe, either by himself or as coauthor, are listed herein with the original orthography. They are listed alphabetically by species with the original citation including page and plate numbers. These correlate with the bibliography of Lowe's works (page 42). The repositories of the type material, institution type numbers and quantity in each lot (where known) are supplied. Richards & Old (1969), Terry-Smith (1978), Sphon (1966), Wilson & Kennedy (1967), and Robertson, Richardson, Davis & Bogan (1981 and 1983) were consulted for information on repositories of Lowe and Pilsbry & Lowe type material. Where the author has learned that changes have been made in institution catalog or type numbers for the species listed, the former numbers follow (with the prefix "ex" in parentheses) the current ones. In Lowe (1935) the numbers used referred to Lowe's private collection and are not noted here. No synonymies are given for the Lowe taxa.

Four species proposed by Lowe (1935) and five species named by Pilsbry & Lowe (1932e and 1934b) were unfigured in the original works. The type of *Nassa bailyi* Pilsbry & Lowe was figured by them in 1934, and in 1935 Pilsbry figured the types of *Bulimulus carmen* and *B. sanmarcosensis* proposed by them in 1932. Paratype specimens of *Micrarionta rowelli mexicana* Pilsbry & Lowe, 1934 were later figured by Drake (1957, pl. 14, fig. 1) and *Micrarionta rowelli bakerensis* Pilsbry & Lowe was later figured by Pilsbry (1939, fig. 117). However, type material of the four Lowe species has not yet been figured to my knowledge. These [*"Fusinus cinereus* (Reeve) variety *coronadoensis,"* *"Fusinus cinereus* (Reeve) variety *sonoraensis,"* *"Fusinus hertleini* variety *albescens,"* and *"Fusinus hertleini* variety *bruneocincta"*] are illustrated herein from type specimens in the San Diego Natural History Museum collection. Comments on the type status of these figured specimens appear on page 32 and beneath each photographed species.

Abbreviations Used

AMNH	American Museum of Natural History
ANSP	Academy of Natural Sciences of Philadelphia
CAS	California Academy of Sciences
CASIZ	CAS Invertebrate Zoology
GeTy	Geology Type Collection [former type designation of CAS]
LACM	Los Angeles County Museum of Natural History
SBMNH	Santa Barbara Museum of Natural History
SDMNH	San Diego Museum of Natural History
USNM	National Museum of Natural History, Smithsonian Institution

Fig'd.	figured
fig(s).	figure(s)
H	holotype
L	lectotype
P	paratype(s)
PL	paralectotype(s)
pl.	plate
sp.	specimen(s)
SYNT	syntype(s)
v.	valve(s)

ILLUSTRATION OF PREVIOUSLY UNFIGURED TYPES NAMED BY LOWE (1935) AND PILSBRY & LOWE (1934b)

Fusinus hertleini albescens Lowe, 1935 The specimen illustrated in Figures 8 and 9 is listed on a SDNHM label and in Wilson & Kennedy (1967:252) as a paratype. The original Lowe label stating "*Fusinus hertleini* var A" indicates it was the "form entirely cream-colored, except two or three post-nuclear whorls which show the brown blotches between the costae" which Lowe named "variety *albescens*." I have been unable to locate a holotype or any other type material of this species.

Fusinus hertleini bruneocincta Lowe, 1935 The specimen illustrated in Figures 10 and 11 is listed on a SDNHM label and in Wilson & Kennedy (1967:252) as a paratype. The original Lowe label stating "*Fusinus hertleini* var -B-" indicates it was the "form with wide white subperipheral band on body whorl and a narrow dark brown band just below" which Lowe named "variety *bruneocincta*." I have been unable to locate a holotype or any other type material of this species.

Fusinus cinereus (Reeve) variety *coronadoensis* Lowe, 1935 Figures 12-15 illustrate two specimens from the type material of this species. An early SDNHM label lists #83113 (ex 558) as holotype (Figures 12 and 13). However the original Lowe label states "-Types-" and 15 additional specimens labeled *F. cinereus coronadoensis* (collected by Lowe at the same time and place) are in SDNHM lot 83114 (ex 1174-1188). One specimen from that lot (ex 1177) is shown in Figures 14 and 15. A piece of crumpled tissue paper in SDNHM 83114 says "holotype Figd."

Wilson & Kennedy (1967:252) consider both lots as hypotypes with the locality as "Isla Coronados, Baja California, Mexico" instead of Isla Coronado in the Gulf of California as stated on Lowe's label and in Lowe (1935:26). After searching the literature, I have not found a figure of the holotype and wonder if photographs had been taken but never published. It is my opinion that the specimens in SDNHM 83113 and 83114 are syntypes of *Fusinus cinereus coronadoensis*.

Fusinus cinereus (Reeve) variety *sonoraensis* Lowe, 1935 According to Lowe's original label, 11 specimens from Miramar, near Guaymas were listed as Types and were in one lot [7551-G (Lowe cat. no.)], now SDNHM 51002 and 51003. Wilson & Kennedy (1967:252) list these specimens as hypotypes with the catalog numbers 561 and 1214-1223. Two other lots of *F. cinereus sonoraensis* were also collected and considered Types by Lowe:

1) SDNHM 51004, 12 sp., (cat. nos. 1203-1213, 560) from San Pedro Nolasco Bay, Sonora, 1932
2) SDNHM 51005, 14 sp., (cat. nos. 1189-1201, 559) from Tepopa Bay, off Isla Tiburon, Sonora, 1933

Allyn Smith, on 6 February 1949 had chosen (but not published) the specimen illustrated in Figures 16 and 17 as lectotype. I herein publish his selection as lectotype.

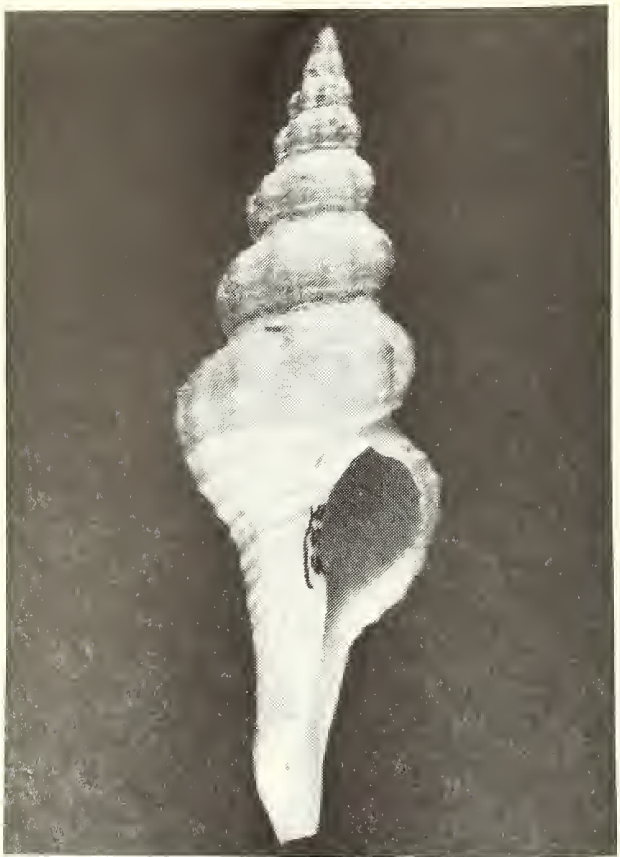

Fig. 8 *Fusinus hertleini albescens* Lowe, 1935
SDNHM 50949 (ex 555) paratype
Type loc.: Tepopa Bay, Sonora

Fig. 9 Dorsal view of specimen shown in Figure 8.
Length: 55.9 mm
Leg. H.N. Lowe Date: 1932

Fig. 10 *Fusinus hertleini bruneocincta* Lowe, 1935
SDNHM 44070 (ex 556) paratype
Type loc.: Tepopa Bay, Sonora

Fig. 11 Dorsal view of specimen shown in Figure 10
Length: 37.1 mm
Leg. H.N. Lowe Date: 1934

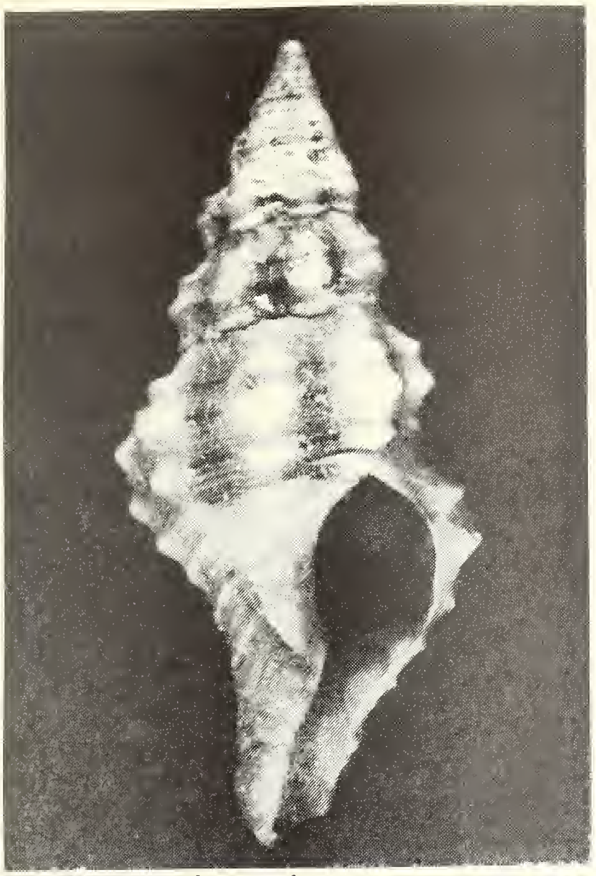

Fig. 12 *Fusinus cinereus* Reeve variety *coronadoensis* Lowe, 1935
SDNHM 83113 (ex 558) Syntype
Type loc: Coronado Is. Gulf of Calif.

Fig. 13 Dorsal view of specimen shown in Figure 12.
Length: 19.4 mm
Leg. H.N. Lowe Date: 1932

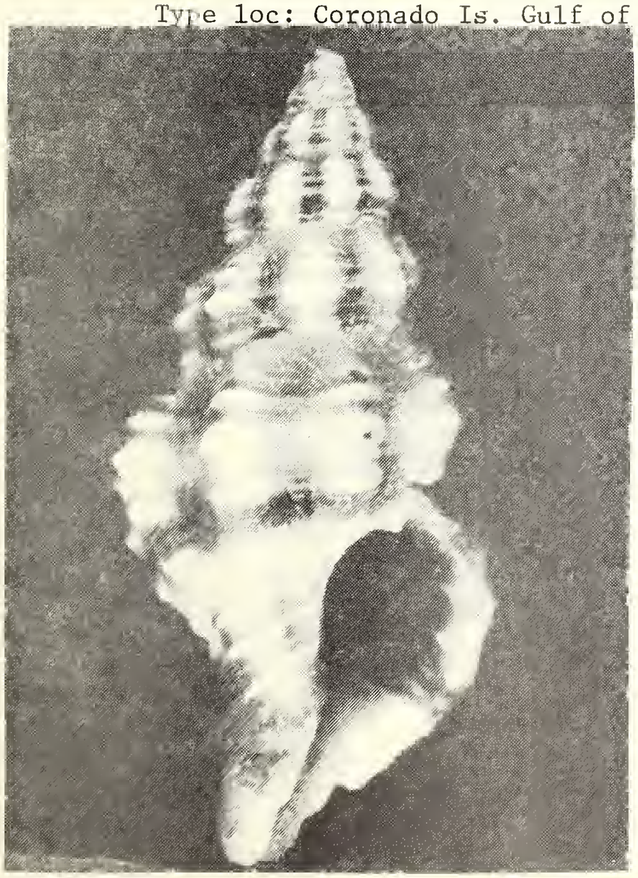

Fig. 14 *Fusinus cinereus* Reeve variety *coronadoensis* Lowe, 1935
SDNHM 83114 (ex 1177) Syntype
Type loc: Coronado Is. Gulf of Calif.

Figure 15 Dorsal view or specimen shown in Figure 14.
Length: 19.6 mm
Leg. H.N. Lowe Date: 1932

Fig. 16 *Fusinus cinereus* (Reeve) variety *sonoraensis* Lowe, 1935
SDNHM 51002 (ex 561) lectotype
Type loc: Miramar, near Guaymas, Sonora, Mexico

Fig. 17 Dorsal view of specimen shown in Figure 16
Length: 23.8 mm
Leg: H.N. Lowe Date: 1932

ACKNOWLEDGMENTS

I would like to thank a number of people who helped me with this project. I am indebted to the following persons who checked the collections in their respective institutions to verify Lowe and Pilsbry & Lowe type material reported to be in their collections: Arthur E. Bogan (ANSP); James H. McLean (LACM); the late Joseph Rosewater (USNM); Robert Van Syoc and Barbara Weitbrecht (CAS); and Paul Scott (SBMNH). Paul Scott was also kind enough to search for and catalogue the Lowe types in the Berry collection recently received by the SBMNH so that the information could be included in this paper. My appreciation is extended to Anthony D'Attilio of the Department of Marine Invertebrates and the trustees of the SDNHM for permitting me to reproduce and publish photographs from the department files and to Billie Meeder, librarian, who kindly searched the archives for additional photo material. David K. Mulliner rephotographed some of the worn pictures and photographed the type material figured in this paper for which I am most grateful. I appreciate the advice of Twila Bratcher and the comments on the manuscript by Anthony D'Attilio and Jules Hertz who also proofread the paper. I am especially grateful to Eugene Coan who carefully reviewed a draft of the manuscript and generously gave many helpful suggestions.

SPECIES DESCRIBED BY LOWE AND PILSBRY AND LOWE

abbotti, Lithophaga--Lowe, 1935:17, pl. 1, fig. 5: H=SDNHM 50611 (ex 474a,b).
acapulcana, Elaeocyma--Lowe, 1935:23, pl. 4, fig. 1: H=SDNHM 51331 (ex 514); P=SDNHM 51332, 3 sp. (ex 515, 2467, 2468).
acapulcana, Hindsia--Pilsbry & Lowe 1932d:66, pl. 7, fig. 11: H=ANSP 155334; P=SDNHM 50954, 5 sp. (ex 577, 2993-2996).
acapulcanum, Lioglyphostoma--Pilsbry & Lowe, 1932d:54, pl. 3, fig. 7: H=ANSP 155196; P=SDNHM 50995, 5 sp. (ex 522, 2473-2476); SBMNH 33988, 2 sp.
acapulcensis, Leda (Saccella)--Pilsbry & Lowe, 1932d:107, pl. 17, figs. 1,2: H=ANSP 155634; P=SDNHM 50595, 3 sp. & 3 v. (ex 464a,b; 1770a,b; 1771a,b; 1772-1774); SBMNH 33987, 2 sp.
adamsiana, Crassispira--Pilsbry & Lowe, 1932d:48, pl. 2, fig. 11: H&P=ANSP 154496; P=SDNHM 50989, 1 sp. (ex 530).
adamsiana, Persicula (Rabicea)--Pilsbry & Lowe, 1932d:62, pl. 4, fig. 9: H=ANSP 155338; P=SDNHM 34400, 1 sp. (ex 773).
adonis, Carinodrillia--Pilsbry & Lowe, 1932d:46, pl. 2, fig. 2: H=ANSP 155209.
albescens, Fusinus hertleini variety--Lowe, 1935:25, [Fig'd. herein, figs. 8,9]: P=SDNHM 50949, 1 sp. (ex 555). [See comment on p. 32].
albipes, Nassarina xeno--Pilsbry & Lowe, 1932d:76, pl. 5, fig. 7: H=ANSP 155055; P=SDNHM 50942, 2 sp. (ex 575, 576).
angelenum, Calliostoma--Lowe, 1935:19, pl. 2, fig. 5: H=SDNHM 13438 (ex 657).
angulicostatus, Nassa--Pilsbry & Lowe, 1932d:115 [*nomen nudum*].
angulicostis, Nassa--Pilsbry & Lowe, 1932d:69, pl. 6, fig. 2: H=ANSP 155331; P=SDNHM 51327, 10 sp. (ex 567, 2917-2925); SDNHM 51328, 6 sp. (ex 568, 2926-2930); SDNHM 51329, 5 sp. (ex 569, 2931-2934); SBMNH 33975, 7 sp.
antiochroa, "Mangelia"--Pilsbry & Lowe, 1932d:56, pl. 3, fig. 8: H=ANSP 155190; P=SDNHM 51196, 4 sp. (ex 543, 2571-2573).
antipyrgus, "Mangelia" (Kurtziella)--Pilsbry & Lowe, 1932d:57, pl. 3, fig. 12: H=ANSP 155189.
aphrogenia, Colubraria--Pilsbry & Lowe, 1932d:62, pl. 4, fig. 10: H=ANSP 155341; P=SDNHM 43733, 1 sp. (ex 565).
ariel, Hindsia--Pilsbry & Lowe, 1932d:66, pl. 6, fig. 4: H=ANSP 155564; P=SDNHM 50986, 2 sp. (ex 578, 2997).
asthenodon, Apolymetis--Pilsbry & Lowe, 1932d:96, pl. 11, figs. 1-3: H=ANSP 116052; P=SDNHM 22628, 7 sp.
atella, Nassarina--Pilsbry & Lowe, 1932d:77, pl. 5, fig. 11: H=ANSP 155206; P=SDNHM 80587, 1 sp. (ex 573); SDNHM 50939, 2 sp. (ex 2978, 2979).
aureonodosa, Crassispira--Pilsbry & Lowe, 1932d:50, pl. 3, fig. 2: H=ANSP 155378.
bailyi, Nassa--Pilsbry & Lowe, 1932e:51 [Fig'd 1934c: pl. 8, fig. 5, not 1932e: pl. 5, figs. 4,5]: H=ANSP 141642; P=ANSP 316711, 2 sp. (ex 141642); ANSP 348649, 1 sp; ANSP 141642a, 5 sp; SDNHM 50953, 7 sp. (ex 571, 2941-2946).
bakerensis, Micrarionta rowelli--Pilsbry & Lowe 1934d:68, [Fig'd. Pilsbry (1939 fig. 117)]: H=ANSP 162958; P=ANSP 162958, 7 sp.; SDNHM 44412, 15 sp.
benitoensis, Helminthoglypta--Lowe, 1930b:43, pl. 5, fig. 1: H=LACM 1021; P=ANSP 151404, 1 sp.; SBMNH 33969, 1 sp.
bertini, Sanguinolaria--Pilsbry & Lowe, 1932d:91, pl. 10, figs. 7,8 (new name): ANSP 152068 [Although original publication states, "may be considered type of the new name," as a renaming of a homonym it has no standing].
bruneocincta, Fusinus hertleini variety--Lowe, 1935:25; [Fig'd. herein, figs. 10, 11]: P=SDNHM 44070 (ex 556), 1 sp. [See comment on p. 32].
brunneocincta, Terebra (Strioterebrum)--Pilsbry & Lowe, 1932d:41, pl. 1, fig. 12: H=ANSP 155288; P=SDNHM 44775, 1 sp. (ex 497).
californiensis, Petricola--Pilsbry & Lowe, 1932d:97, pl. 13, figs. 7-9: H=ANSP 114337.
carissima, Cytharella--Pilsbry & Lowe, 1932d:58, pl. 4, figs. 1,1a: H=ANSP 155211.
carmen, Anachis--Pilsbry & Lowe, 1932d:71, pl. 5, fig. 4: H&P=ANSP 16947; P=SDNHM 43452, 21 sp. (ex 546, 2592-2611); SBMNH 33976, 2 sp.

carmen, Bulimulus--Pilsbry & Lowe, 1932e:50 [Fig'd. Pilsbry (1935, pl. 1, fig. 7) not 1932e: pl. 5, fig. 2]: H=ANSP 158995; P=SDNHM 11454, 7 sp. (ex 3583-3589); CASIZ 055951, 2 sp. (ex SU 6042); SBMNH 33993, 2 sp.

carmen, Tritonalia--Lowe, 1935:20, pl. 2, fig. 6: H=SDNHM 44717 (ex 590); P=SDNHM 44717A, 1 sp. (ex 592); SDNHM 44717B, 3 sp. (ex 591, 3126-3127).

carmencita, Strombina--Lowe, 1935:21, pl. 3, fig. 1: H=SDNHM 42909 (ex 586).

chiquita, Heliacus--Pilsbry & Lowe, 1932d:83, pl. 8, figs. 12-14:H=ANSP 155440.

concepcionensis, (?) Homalopoma--Lowe, 1935:24, pl. 4, fig. 3: H=SDNHM 51314 (ex 650); P=SDNHM 51315, 2 sp. (ex 3244,3245).

corintoensis, Terebra (Strioterebrum)--Pilsbry & Lowe, 1932d:42, pl. 1, fig. 5: H=ANSP 155281.

coronadoensis, Fusinus cinereus (Reeve) variety--Lowe, 1935:26, [Fig'd. herein, figs. 12-15]: SYNT=SDNHM 83113, 1 sp.; SDNHM 83114, 15 sp.[(ex 1174-1188) as "hypotypes" in Wilson & Kennedy (1967)].

cybele, Syntomodrillia--Pilsbry & Lowe, 1932d:46, pl. 2, fig. 6: H=ANSP 155201; P=SDNHM 51000, 1 sp. (ex 516).

cymatias, "Mangelia"--Pilsbry & Lowe, 1932d:56, pl. 3, fig. 10: H=ASNP 155191; P=SDNHM 50998, 3 sp. (ex 544, 2574-2575).

decimdentata, Anachis--Pilsbry & Lowe, 1932d:72, pl. 5, fig. 2: H=ANSP 156759; P=SDNHM 43456, 2 sp. (ex 581, 2999).

delgada, Arca--Lowe, 1935:16, pl. 1, fig. 2: H=SDNHM 43460, 1 v. (ex 469); P=SDNHM 78293, 1 v. (ex 1861); CASIZ 055958 (ex GeTy 5547).

delgada, Cacodaphnella--Pilsbry & Lowe, 1932d:58, pl. 4, figs. 8, 8a: H=ANSP 155194.

dichroa, Carinodrillia--Pilsbry & Lowe, 1932d:46, pl. 2, fig. 5: H=ANSP 155202; P=SDNHM 51193, 2 sp. (ex 517, 2469); SDNHM 51194, 1 sp. (ex 518); SDNHM 51195, 1 sp. (ex 519).

dilecta, Pholas--Pilsbry & Lowe, 1932d:88, pl. 11, figs. 8,9: H=ANSP 156299.

dulcis, Cuspidaria (Cardiomya)--Pilsbry & Lowe, 1932d:104, pl. 17, figs. 20-22: H=ANSP 15564; P=SDNHM 27166, 10 sp. & 6 v.

ella, Brephodrillia--Pilsbry & Lowe, 1932d:48, pl. 2, fig. 9: H=ANSP 155203; P=SDNHM 51311, 4 sp. (ex 520, 2470-2472).

erebus, Crassispira--Pilsbry & Lowe, 1932d:49, pl. 2, fig. 10: H=ANSP 155379; P=SDNHM 50982, 3 sp. (ex 531, 2495-2496).

erythronotus, Tellina (Angulus)--Pilsbry & Lowe, 1932d:94, pl. 12, fig. 7: H&P=ANSP 155010; P=SDNHM 50644, 6 sp. & 4 v. (ex 646a,b, 3199a,b-3204a,b, 3205, 3206); SBMNH 34006, 2 sp.

exaggeratum, Cerithium stercusmuscarum Val. form--Pilsbry & Lowe, 1932d:81, pl. 8, figs. 2-4: H=ANSP 153917; P=SDNHM 12205, 2 sp. (ex 603, 3161).

exoptata, Leda (Adrana)--Pilsbry & Lowe, 1932d:107, pl. 17, figs. 8,9: H=ANSP 155633; P=SDNHM 50598, 11 sp. (ex 465a,b, 1823a,b -1832a,b); SBMNH 34486, 2 sp.

felipensis, Fusinus--Lowe, 1935:25, pl. 4, fig. 6: H=SDNHM 51187 (ex 552); P=SDNHM 50985, 15 sp. (ex 553, 1160-1173); CASIZ 055961, 4 sp. (ex GeTy 8370-8372, 8372a); SBMNH 33962, 2 sp.

finitima, Cytharella--Pilsbry & Lowe, 1932d:60, pl. 4, fig. 5: H=ANSP 155212; P=SDNHM 51001, 6 sp. (ex 512, 2461-2465); SBMNH 34286, 2 sp.

flavonodosa, Crassispira--Pilsbry & Lowe, 1932d:51, pl. 3, fig. 1: H=ANSP 155339; P=SDNHM 50981, 5 sp. (ex 532, 533, 2497-2499).

fonseca, Crassispira--Pilsbry & Lowe, 1932d:50, pl. 3, fig. 11: H=ANSP 155522; P=SDNHM 50991, 18 sp. (ex 534, 2500-2516); SBMNH 33984, 3 sp.

fonsecana, Acmaea--Pilsbry & Lowe, 1932d:87, pl. 10, fig. 12: H=ANSP 156854; P=ANSP 316708, 5 sp.; SDNHM 13408, 21 sp. (ex 504, 2434-2453); SBMNH 33983, 2 sp

fredbakeri, Aesopus--Pilsbry & Lowe, 1932d:74, pl. 14, fig. 6: H=ANSP 156340; P=SDNHM 43453, 3 sp. (ex 587, 3110-3111).

fredbakeri, Fusinus--Lowe, 1935:24, pl. 4, fig. 5: H=SDNHM 50951 (ex 557): P=SDNHM 50955, 23 sp. (ex 551, 1138-1159); CASIZ 055962, 4 sp. (ex GeTy 8373-8376). SBMNH 33963, 2 sp.

gaylordianum, Epitonium (Nitidiscala)--Lowe, 1932b:114, pl. 9, fig. 1: H=ANSP 157987; P=SDNHM 44056, 6 sp. (ex 595, 3132-3136);

gemmuloides, Calliostoma--Lowe, 1935:19, pl. 2, fig. 4: H=SDNHM 50791 (ex 656); P=SDNHM 50790, 2 sp. (ex 3281-3282).

goniocyma, Mactra (Mactrinula)--Pilsbry & Lowe, 1932d:90, pl. 15, figs. 5,6: H=ANSP 155567.
gordita, Arca--Lowe, 1935:16, pl. 1, fig. 1: H=SDNHM 16811, 1 v.; P=SDNHM 50569, 3 v.; CASIZ 055959, 1 v. (ex GeTy 6071).
granti, Mitrella--Lowe, 1935:20, pl. 2, fig. 7: H=SDNHM 12903A (ex 558); P=SDNHM 12903, 15 sp. (ex 559, 3112-3125); SBMNH 33965, 2 sp.
guaymasensis, Nassa--Pilsbry & Lowe, 1932e:69, pl. 6, fig. 3: H=ANSP 155332; P=SDNHM 33294, 3 sp.
guaymasensis, Psammosolen--Lowe, 1935:18, pl. 1, fig. 7: H=SDNHM 50778, 1 v. (ex 489); P=SDNHM 50777, 1 v. (ex 490).
guaymasensis, Semele--Pilsbry & Lowe 1932d:92, pl. 12, figs. 8,9: H=ANSP 155011; P=SDNHM 50772, 3 v. (ex 484, 2024-2025).
guaymasensis, Tellina (Angulus)--Pilsbry & Lowe, 1932d:94, pl. 16, fig. 7: H=ANSP 155573; P=SDNHM 50776, 2 sp. & 4 v. (ex 482a,b 2019a,b, 2020-2023); SBMNH 34007, 1 sp.
hastula, Cytharella--Pilsbry & Lowe, 1932d:59, pl. 4, fig. 4: H=ANSP 155210.
hermanita, Crassispira--Pilsbry & Lowe, 1932d:53, pl. 3, fig. 6: H=ANSP 155377; P=SDNHM 50992, 1 sp. (ex 535).
hermosa, Hemitoma--Lowe, 1935:24, pl. 4, fig. 4: H=SDNHM 13439 (ex 660); P=SDNHM 81659, 1 sp. (ex 3291).
hertleini, Fusinus--Lowe, 1935:25, pl. 4, fig. 7: H=SDNHM 50950 (ex 554).
hesperia, Mazatlania--Pilsbry & Lowe, 1932d:74, pl. 1, figs. 8,9: H=ANSP 156342.
hilli, Anachis (Glyptanachis)--Pilsbry & Lowe, 1932d:73, pl. 5, fig. 6: H=ANSP 152124; P=SDNHM 50801, 19 sp. (ex 549, 582, 2654-2671); SDNHM 49101, 7 sp. (ex 3007, 3009, 3011, 3001-3003, 3005); SDNHM 13399, 14 sp. (ex 3012-3025). SBMNH 33989, 12 sp.
hindsiana, Arene--Pilsbry & Lowe, 1932d:86, pl. 9, figs. 4,5: H=ANSP 155438; P=SDNHM 43463, 2 sp. (ex 654, 3262).
ideopoma, Natica--Pilsbry & Lowe, 1932d:84, pl. 9, figs. 8-11: H=ANSP 155437; P=SDNHM 44416, 1 sp. (ex 649).
impar, Leda--Pilsbry & Lowe, 1932d:106, pl. 17, figs. 3-6: H=ANSP 155636; P=SDNHM 50597, 13 sp. (ex 466a,b, 1844a,b-1855a,b).
insignis, Recluzia--Pilsbry & Lowe, 1932d:80, pl. 9, fig. 3: H=ANSP 155432.
interruptelineata, Alaba--Pilsbry & Lowe, 1932d:81, pl. 6, fig. 12: H=ANSP 155195; P=SDNHM 43454, 16 sp. (ex 648, 3229-3243); SBMNH 33980, 3 sp.
iola, Terebra (Microtrypetes)--Pilsbry & Lowe, 1932d:43, pl. 1, fig. 3: H=ANSP 155289; P=SDNHM 44774, 4 sp. (ex 498, 2421-2423).
ira, Terebra (Strioterebrum)--Pilsbry & Lowe, 1932d:40, pl. 1, fig. 13: H=ANSP 155280; P=SDNHM 44777, 4 sp. (ex 499, 2424-2426); SBMNH 33992, 1 sp.
isopleura, Terebra (Strioterebrum)--Pilsbry & Lowe, 1932d:41, pl. 1, fig. 6: H=ANSP 155283; P=SDNHM 44776, 1 sp. (ex 500).
isthmica, Mactra (Micromactra)--Pilsbry & Lowe, 1932d:89, pl. 15, figs. 1,2, pl. 16. fig. 5: H&P=ANSP 130402 "3 valves, 1 photographed valve, no distinction Cotypes" (Bogan, *in litt*); P=SDNHM 50783, 5 sp. (ex 493a,b; 2330a,b-2333a,b).
jaculum, Carinodrillia--Pilsbry & Lowe, 1932d:45, pl. 2, fig. 3: H=ANSP 155354; P=SDNHM 50996, 1 sp. (ex 523).
jaculum, Strombiformis--Pilsbry & Lowe, 1932d:78, pl. 6, fig. 11: H=ANSP 155199.
laeviradius, Leda--Pilsbry & Lowe, 1932d:106, pl. 17, fig. 7: H=ANSP 155635; P=SDNHM 50599, 5 sp. (ex 467a,b,1856a,b-1859a,b).
lalage, Mitrella--Pilsbry & Lowe, 1932d:70, pl. 5, figs. 8,9: H=ANSP 15211; P=CASIZ 055954, 32 sp. (ex SU 6229); SBMNH 11897, 2 sp., SBMNH 33991,145 sp., SDNHM 41905, 12 sp. (ex 548, 2643-2653); SDNHM 50943, 32 sp. (ex 547, 2612-2642).
lamproleuca, Tellina--Pilsbry & Lowe, 1932d:93, pl. 11, figs. 6,7: H=ANSP 155310.
lenis, Pitar--Pilsbry & Lowe, 1932d:100, pl. 16, fig. 6: H=ANSP 155592; P=SDNHM 50639, 3 v. (ex 478, 2013, 2015).
leucocymoides, Phacoides (Pleurolucina)--Lowe, 1935:17, pl. 1, fig. 4: H=SDNHM 13459, 1 v. (ex 1626); P=SDNHM 27335, 4 v. (ex 1632-1635); SDNHM 27334, 5 v. (ex 1627-1631).

leucops, Nassa--Pilsbry & Lowe, 1932e:51, pl. 5, fig. 3: H=ANSP 158260; P=SDNHM 50952, 31 sp. (ex 572, 2947-2976).
ligyrus, Terebra (Strioterebrum)--Pilsbry & Lowe, 1932d:40, pl. 1, figs. 10, 11: H=ANSP 155279; P=SDNHM 44772, 8 sp. (ex 496, 3029-3035); SBMNH 33971, 2 sp.
linearum, Pyramidella (Voluspa)--Pilsbry & Lowe, 1932d:79, pl. 6, fig. 7: H=ANSP 155198; P=SDNHM 44722, 1 sp. (ex 598).
longisinuatus, Tagelus affinis--Pilsbry & Lowe, 1932d:91, pl. 11, figs. 4,5: H&P=ANSP 51523.
loxospira, Crassispira--Pilsbry & Lowe, 1932d:52, pl. 3, fig. 3: H=ANSP 155375; P=SDNHM 50990, 1 sp. (ex 536).
lyrica, Tellina (Macaliopsis)--Pilsbry & Lowe, 1932d:94, pl. 10, figs. 4,4a: H=ANSP 156800; P=SDNHM 50774, 1 v.(ex 483).
mariamadrae, Tegula mariana--Pilsbry & Lowe, 1932d:85, pl. 10, figs. 13-14a: H=ANSP 156853; P=ANSP 316699, 5 sp. (ex 156853); CASIZ 055955, 5 sp. (ex SU 6230); SDNHM 50789, 9 sp. (ex 653, 3254-3261); SBMNH 33986, 5 sp.
mariato, Terebra (Microtrypetes)--Pilsbry & Lowe, 1932d:43, pl. 1, fig. 7: H=ANSP 155284; P=SDNHM 44778, 7 sp. (ex 503, 2428-2433); SBMNH 33972, 1 sp.
marshalli, Calliostoma--Lowe, 1935:19, pl. 2, fig. 3: H=SDNHM 13437 (ex 659); P=SDNHM 49103, 9 sp. (ex 3283-3290); USNM 427770, 1 sp; SBMNH 33966, 2 sp.
mazatlanica, Daphnella--Pilsbry & Lowe, 1932d:61, pl. 4, fig. 7: H=ANSP 155340; P=SDNHM 51189, 2 sp. (ex 508, 2457); SDNHM 51190, 1 sp. (ex 507); SDNHM 51191, 1 sp. (ex 509).
mazatlanicus, Heliacus--Pilsbry & Lowe, 1932d:83, pl. 8, figs. 6-8: H=ANSP 152121; P=SDNHM 49121, 18 sp. (ex 605, 3163-3179); SBMNH 33990, 7 sp.
mazatlanicus, Turbo--Pilsbry & Lowe, 1932d:87, pl. 9, fig. 6: H=ANSP 155434; P=SDNHM 50787, 5 sp. (ex 652, 3250-3253).
mediamericana, Semele--Pilsbry & Lowe, 1932d:92, pl. 12, figs. 1,2: H&P=ANSP 53295.
melanoderma, Arca (Barbatia?)--Pilsbry & Lowe, 1932d:105, pl. 14, figs. 11-13: H=ANSP 155627; P=SDNHM 41595, 2 sp. (ex 642a,b, 3180a,b).
melanosticta, "Mangelia" (Steironepion)--Pilsbry & Lowe, 1932d:56, pl. 3, fig. 9: H=ANSP 155192; P=SDNHM 50944, 17 sp. (ex 545, 2576-2591); SBMNH 33974, 2 sp.
metodon, Chione--Pilsbry & Lowe, 1932d:100, pl. 15, figs. 10, 11: H=ANSP 155571; P=SDNHM 50781, 2 sp. & 2 v. (ex 480a,b, 2017a,b, 2018, 3426).
mexicana, Crassinella--Pilsbry & Lowe, 1932d:103, pl. 14, figs. 8,9: H=ANSP 15562.
mexicana, Micrarionta rowelli--Pilsbry & Lowe, 1934d:67 [Fig'd. Drake(1957, pl. 14, fig. 1)]: H=ANSP 162959; P=ANSP 162959, 3 sp.; SDNHM 44411, 12 sp. (ex 447, 1443-1453); SBMNH 33970, 2 sp.
montezuma, Chione--Pilsbry & Lowe, 1932d:101, pl. 15, figs. 12-14: H=ANSP 155569.
montijoensis, Terebra (Strioterebrum)--Pilsbry & Lowe, 1932d:42, pl. 1, fig. 1: H=ANSP 155285; P=SDNHM 44779, 1 sp. (ex 501).
multa, Engina senae--Pilsbry & Lowe, 1932d:64, pl. 7, figs. 7,8: H=ANSP 155328; P=SDNHM 50946B, 2 sp. (ex 564, 2916).
nautica, Clathrodrillia--Pilsbry & Lowe, 1932d:44, pl. 2, fig. 1: H=ANSP 155355; P=SDNHM 51313, 2 sp. (ex 524, 2477); SDNHM 51312, 1 sp. (ex 525).
nereis, Cytharella--Pilsbry & Lowe, 1932d:59, pl. 4, fig. 2: H=ANSP 155213; P=SDNHM 51188, 2 sp. (ex 513, 2466).
nicaraguense, Cerithium (Thericium)--Pilsbry & Lowe, 1932d:82, pl. 8, fig. 15: H=ANSP 155335; P=SDNHM 49120, 2 sp. (ex 604, 3162).
nymphia, Crassispira--Pilsbry & Lowe, 1932d:51, pl. 10, fig. 11: H=ANSP 156343; P=SDNHM 50983, 10 sp. (ex 539, 2547-2555).
omissa, Macrocallista (Chionella)--Pilsbry & Lowe, 1932d:102, pl. 17, figs. 13-16: H=ANSP 155590; P=SDNHM 50780, 5 sp. (ex 477a,b, 1955a,b-1958a,b).
ordenanum, Epitonium (Nodiscala)--Lowe, 1932b:114, pl. 9, figs. 3,3a: H=ANSP 157987.
pacis, Macoma--Pilsbry & Lowe, 1932d:95, pl. 10, figs. 1-3: H=ANSP 152069; P=SDNHM 50775, 2 sp.

pammicra, Nassarina--Pilsbry & Lowe, 1932d:77, pl. 5, fig. 12: H=ANSP 155430.
panamica, Daphnella--Pilsbry & Lowe, 1932d:60, pl. 4, figs. 6,6a: H=ANSP 155342; P=SDNHM 44054, 2 sp. (ex 510, 2458); SDNHM 45219, 3 sp. (ex 511, 2459-2460).
parallela, Petricola gracilis--Pilsbry & Lowe, 1932d:99, pl. 13, figs. 4-6: H=ANSP 155591; P=SDNHM 50779, 1 sp. (ex 481a,b).
parthenopa, Macoma--Pilsbry & Lowe, 1932d:133 [no description], pl. 11, figs. 6,7: SYNT=ANSP 155310, 1 v. (Bogan, *in litt.*) [Figure 7 is the type from Corinto, Ecuador. Figure 6, stated as from the Amherst coll., is not listed as a type].
pazensis, Solen--Lowe, 1935:17, pl. 1, fig. 6: H=SDNHM 50564 (ex 491a,b); P=SDNHM 81868, 5 sp. (ex 492a,b, 2326a,b-2329a,b); SBMNH 34003, 1 sp.
pembertoni, Clavus--Lowe, 1935:22, pl. 3, fig. 6: H=SDNHM 50947 (ex 528).
penascoensis, Leda (Adrana)--Lowe, 1935:18, pl. 1, fig. 8: H=SDNHM 43462; P=SDNHM 50570, 1 sp. (ex 1860) [one valve broken].
penascoensis, Turbonilla (Ptycheulimella)--Lowe, 1935:21, pl. 3, fig. 3: H=SDNHM 44782 (ex 599); P=SDNHM 44782A, 14 sp. (ex 600, 3143-3155).
perfectus, Brephodrillia--Pilsbry & Lowe, 1932d:47, pl. 2, figs. 7,8: H=ANSP 155204; P=SDNHM 50999, 1 sp. (ex 521).
perfragilis, Pitar--Pilsbry & Lowe, 1932d:100, pl. 17, figs. 10-12: H=ANSP 155490; P=SDNHM 50613, 1 sp. (ex 2016a,b).
pilsbryi, Clathrodrillia--Lowe, 1935:23, pl. 4, fig. 2: H=SDNHM 51333 (ex 527); P=SDNHM 50997, 12 sp. (ex 526, 2478-2488); SBMNH 33967, 2 sp.
pilsbryi, Zirfaea--Lowe, 1931b:53, pl. 3, figs. 1,2: H=ANSP 50809.
pinchoti, Codakia--Pilsbry & Lowe, 1932d:103, pl. 14, figs. 1,2: H&P=ANSP 153792 "3 valves in one box, type & paratypes" (Bogan, *in litt*).
planispira, Heliacus--Pilsbry & Lowe, 1932d:83, pl. 8, figs. 9-11: H=ANSP 155430; P=SDNHM 30545, 2 sp. (ex 3613, 3614).
pluto, Crassispira--Pilsbry & Lowe, 1932d:49, pl. 2, fig. 12: H=ANSP 155379; P=SDNHM 43748, 14 sp. (ex 2531-2544); SDNHM 43532a, 2 sp. (ex 537, 538).
poecila, Nassarina--Pilsbry & Lowe, 1932d:76, pl. 5, fig. 10: H=ANSP 155053; SDNHM 50940, 11 sp. (ex 574, 2979-2988); SBMNH 33978, 3 sp.; SBMNH 33979, 2 sp.
polypenus, Terebra (Microtrypetes?)--Pilsbry & Lowe, 1932d:44, pl. 1, fig. 4: H=ANSP 155282.
puntarenensis, Mytilus (Hormomya)--Pilsbry & Lowe, 1932d:104, pl. 10, fig. 6: H=ANSP 155629; P=CASIZ 055953, 10 sp. (ex SU 6231); SDNHM 50567, 43 sp, (ex 473a,b, 1864a,b-1906a,b); SBMNH 33973, 4 sp.
quaylei, Simnia--Lowe, 1935:22, pl. 3, fig. 5: H=SDNHM 43473 (ex 602); P=CASIZ 055963, 2 sp. (ex GeTy 7169, 7170); SBMNH 33968, 1 sp.
reinharti, Arca (Anadara)--Lowe, 1935:16, pl. 1, figs. 3a-3c: H=SDNHM 16810 (ex 472a,b); P=CASIZ 055957, 1 sp. (ex GeTy 4697, 4697a).
rhypis, Pandora (Kennerlia)--Pilsbry & Lowe, 1932d:105, pl. 16, figs. 8-11: H= ANSP 155503; P=SDNHM 27198, 11 sp; SBMNH 34009, 21 sp.
roperi, Terebra (Strioterebrum?)--Pilsbry & Lowe, 1932d:41, pl. 1, fig. 14: H=ANSP 155287; P=SDNHM 44781, 1 sp. (ex 502); SDNHM 44781A, 1 sp. (ex 2427).
sanctijohannis, Sigaretus--Pilsbry & Lowe, 1932d:84, pl. 9, fig. 7: H=ANSP 155436.
sanfelipensis, Anachis--Lowe, 1935:20, pl. 2, fig. 8: H=SDNHM 43458 (ex 583); P=SDNHM 49100, 4 sp. (ex 584, 3026-3028); CASIZ 055960, 3 sp. (ex GeTy 9916-9918); SBMNH 33964, 1 sp.
sanjuanense, Epitonium (Nodiscala)--Lowe, 1932b:115, pl. 9, fig. 4: H=ANSP 157989.
sanjuanensis, Terebra (Strioterebrum)--Pilsbry & Lowe, 1932d:42, pl. 1, fig. 2: H=ANSP 155286.
sanmarcosensis, Bulimulus--Pilsbry & Lowe, 1932e:49 [Fig'd. Pilsbry (1935, pl. 1, fig. 8) not 1932e: pl. 5, fig. 1]: H=ANSP 158976; P=CASIZ 055952, 4 sp. (ex SU 6191); SDNHM 13376, 20 sp. (ex 3593-3612); SBMNH 34073, 4 sp.

senae, Engina--Pilsbry & Lowe, 1932d:63, pl. 7, figs. 5,6: H=ANSP 155326; P=SDNHM 50946a, 2 sp. (ex 563, 2915).
simplicissima, Semele--Pilsbry & Lowe, 1932d:93, pl. 12, figs. 6,6a: H=ANSP 155014; P=SDNHM 50771, 1 sp. & 1 v. (ex 485a,b, 2026).
solitaria, Crassispira--Pilsbry & Lowe, 1932d:53, pl. 3, fig. 5: H=ANSP 155374; P=SDNHM 50988, 1 sp. (ex 540).
sonoraensis, Fusinus cinereus (Reeve) variety--Lowe, 1935:26, Lectotype fig'd. herein, figs. 16, 17: L=SDNHM 51002 (ex 561); PL=SDNHM 51003, 10 sp. (ex 1214-1223); SDNHM 51005, 14 sp. (ex 559, 1189-1201); SDNHM 51004, 12 sp. (ex 560, 1203-1213); SBMNH 33961, 2 sp.
soror, Carinodrillia halis--Pilsbry & Lowe, 1932d:45, pl. 2, fig. 4: H=ANSP 155207; P=SDNHM 51192, 7 sp. (ex 529, 2489-2494).
sororcula, Transenella--Pilsbry & Lowe, 1932d:102, pl. 9, figs. 12-16: H=ANSP 155599; P=SDNHM 50641, 22 sp. & 1 v. (ex 476a,b, 1954, 1933a,b-1953a,b); SBMNH 33982, 3 sp.
squamuligera, Chama--Pilsbry & Lowe, 1932d:103, pl. 14, fig. 10: H=ANSP 155623; P=SDNHM 50602, 2 sp. & 3 v. (ex 475a,b, 1921a,b, 1922-1924); SBMNH 34004, 1 sp.
strongi, Engina--Pilsbry & Lowe, 1932d:65, pl. 16, fig. 12: H=ANSP 156774.
strongi, Epitonium (Nitidiscala)--Lowe, 1932b:115, pl. 9, fig. 5 [*non* Bartsch, 1928; see *strongianum* Lowe, 1932c]: H=ANSP 155535; P=SDNHM 50387, 5 sp. (ex 596, 3137-3140); SBMNH 33974, 1 sp.
strongianum, Epitonium--Lowe, 1932c:36 [replacement name for *Epitonium (Nitidiscala) strongi* Lowe, 1932b. See type information for *E. strongi*].
subangularis, Strombina--Lowe, 1935:21, pl. 3, fig. 2: H=SDNHM 42910 (ex 585).
tabogensis, Caducifer(?)--Pilsbry & Lowe, 1932d:67, pl. 6, fig. 5: H=ANSP 153872; P=SDNHM 50987, 1 sp. (ex 566).
tabogensis, Semele--Pilsbry & Lowe, 1932d:91, pl. 12, figs. 5-5b: H=ANSP 155012; P=SDNHM 50770, 3 v. (ex 486, 2316-2317).
taeniornata, Cytharella--Pilsbry & Lowe, 1932d:60, pl. 4, fig. 3: H=ANSP 155208.
terissa, Odostomia (Chrysallida)--Pilsbry & Lowe, 1932d:80, pl. 6, fig. 10: H=ANSP 155188.
thaleia, Caducifer (?)--Pilsbry & Lowe, 1932d:67, pl. 6, fig. 6: H=ANSP 81972.
trimariana, Crassispira--Pilsbry & Lowe, 1932d:52, pl. 3, fig. 4: H=ANSP 155380; P=SDNHM 50984, 14 sp. (ex 541, 2556-2568); SDNHM 22829, 4 sp.
trimariana, Odostomia (Chrysallida)--Pilsbry & Lowe, 1932d:79, pl. 6, figs. 9, 9a: H=ANSP 155435; P=SDNHM 49123, 6 sp. (ex 601, 3156-3160); SBMNH 33985, 2 sp.
tripsycha, Vermetus--Pilsbry & Lowe, 1932d:82, pl. 14, figs. 3-5: H=ANSP 155537; P=ANSP 316698, 1 sp. (ex 155537); SDNHM 29570, 4 sp.
uncifera, Pandora--Pilsbry & Lowe, 1932d:104, pl. 17, figs. 17-19: H=ANSP 155632; P=SDNHM 27199, 4 sp. & 2 v.
vanattae, Mactra (Micromactra)--Pilsbry & Lowe, 1932d:90, pl. 16, figs. 4-4b: H=ANSP 155931; P=SDNHM 50784, 5 sp. (ex 494a,b, 2334a,b-2337a,b); SBMNH 34008, 1 sp.
vesperis, Turbonilla (Mormula)--Pilsbry & Lowe, 1932d:79, pl. 6, figs. 8, 8a: H=ANSP 155197.
vespertina, Sanguinolaria--Pilsbry & Lowe, 1932d:90, pl. 12, figs. 3, 4: H=ANSP 155013; P=SDNHM 50773, 6 sp. & 2 v. (ex 488a,b, 2319a,b-2323a,b, 2324-2325); SBMNH 34005, 2 sp.
winslowae, Arene--Pilsbry & Lowe, 1932d:86, pl. 9, figs. 1-2a: H=ANSP 155433; P=CASIZ 055956, 3 sp. (ex SU 7786); SDNHM 50788, 12 sp. (ex 655, 3263-3273); SDNHM 13440, 7 sp. (ex 3274-3280); SBMNH 33981, 10 sp.
xenicus, Aesopus--Pilsbry & Lowe, 1932d:73, pl. 14, fig. 7: H=ANSP 156341.
xeno, Nassarina--Pilsbry & Lowe, 1932d:75, pl. 5, fig. 5: H=ANSP 155056; P=SDNHM 50941, 4 sp. (ex 2989-2992); SBMNH 33977, 1 sp.

BIBLIOGRAPHY OF WORKS BY HERBERT N. LOWE

Lowe, Herbert N.

1895 My first year collecting and studying shells. Trans. Isaac Lea Conch. Chap. of Agassiz Assoc. for 1894. Printed Nautilus 9(7):80-81, [4 Nov.].

1896 Cuttle fishes washed ashore in San Pedro Bay. [Extract from report of H. Lowe from Trans. Isaac Lea Conch. Chap. for 1895]. Nautilus 10(1):11-12 [3 May].

1897 Collecting during the summer of '96. [Extract from report of H. Lowe from Trans. Isaac Lea Chap. for 1896]. Nautilus 11(7):80-81 [1 Nov.].

1899 Dredging off San Pedro. Nautilus 13(3):27-30 [29 June].

1913 Shell collecting on the west coast of Baja California. Nautilus 27(3):25-29 [18 July].

1916 Shell collecting in the Sierra Nevadas. Nautilus 30(8):92-95 [30 Dec.].

1930a Correspondence [To friends and readers of The Nautilus:—]. Nautilus 43(4):135-138 [24 April]

1930b Shell collecting on the West Mexican coast, II. Nautilus 44(1):24-27 [17 July].

1930c A new land shell from San Benito County, California. Nautilus 44(2):42-43, pl. 5, fig. 1 [21 Oct.].

1931a What is *Roperia roperi* Dall: with notes on Turridae and Columbellidae. Nautilus 45(2):51-52 [14 Oct.].

1931b Note on the west coast *Zirfaea*. Nautilus 45(2):52-53, pl. 3, figs. 1,2 [14 Oct.].

1932a Shell collecting in west Central America. Nautilus 45(3):73-82 [9 Jan.].

1932b On four new species of *Epitonium* from western Central America. Nautilus 45(4):113-115, pl. 9, figs. 1-10. [9 Apr.].

1932c Notes & news, Nautilus 46(1):36 [23 July].

1933a The cruise of the "Petrel." Nautilus 46(3):73-76 [25 Jan.].

1933b The cruise of the "Petrel." (cont'd) Nautilus 46(4):109-115, 1 map [25 Apr.].

1933c At the head of the Gulf of California. Nautilus 47(2):45-47 [1 Nov.].

1934a On the Sonoran side of the Gulf. Nautilus 48(1):1-4 [10 July].

1934b On the Sonoran side of the Gulf. (cont'd) Nautilus 48(2):43-46 [15 Oct.].

1935 New marine Mollusca from West Mexico, together with a list of shells collected at Punta Penasco, Sonora, Mexico. Trans. SDSNH 8(6):15-34, pls. 1-4 [21 Mar.].

Pilsbry, Henry A. & Herbert N. Lowe

1931c Land shells collected by Mr. H.N. Lowe in western Mexico. [By H.A.P., with notes by H.N. Lowe]. Nautilus 44(3):81-84 [27 Jan.]. Fig'd. 44(2):pl. 5, figs. 5, 12 [21 Oct. 1930]

1932d West Mexican and Central American mollusks collected by H.N. Lowe, 1929-31. Proc. ANSP 84:33-144, figs. 1-6, pls. 1-17 [21 May].

1932e New west American species of *Bulimulus* and *Nassa*. Nautilus 46(2):49-52 [22 Oct.]. Fig'd. 47(3): pl. 8, fig. 5 (*Nassa bailyi*) [26 Jan. 1934]. [For figures of *Bulimulus carmen* and *B. sanmarcosensis* see Pilsbry (1935) in Lit. Cited].

1934c West American Chamidae, *Periploma* and *Glycymeris*. Nautilus 47(3):81-86, pl. 8 [26 Jan.].

1934d Some desert helices of the genus *Micrarionta*. Nautilus 48(2):67-68 [15 Oct.].

1936a *Sanguinolaria bertini* Pilsbry & Lowe. Nautilus 49(4):140 [1 May].

Strong, A.M. & H.N. Lowe

1936b West American species of the genus *Phos*. Trans. SDSNH 8(22):305-320, pl. 22 [7 Dec.].

LITERATURE CITED

CLENCH, WILLIAM J. & RUTH D. TURNER
1962 New names introduced by H.A. Pilsbry in the Mollusca and Crustacea. ANSP Sp. Publ. 4, 218 pp.

DRAKE, ROBERT J.
1957 *Micrarionta* (Mollusca: Pulmonata) from northwestern Sonora, Mexico. Bull. So. Cal. Acad. Sci. 56(2):76-80, pls. 14,15 [31 Aug.].

HAND, EDWIN E.
1926 Seeking land shells in Cuba. Nautilus 40(2):37-41 [22 Oct.].

KEEP, JOSIAH
1887 WEST COAST SHELLS. Bancroft Bros., San Francisco, CA, 230 pp., 182 figs.; frontis. [July 1887].

PILSBRY, HENRY A.
1927 Cuban land shells of the Lowe-Hand-Emery expedition. Nautilus 40(3): 73-75, pl. 1 [1 Feb.].
1928 Cuban land snails collected by H.N. Lowe. Nautilus 41(3):79-81 [17 Jan.]
1935 Descriptions of middle American land and freshwater Mollusca. Proc. ANSP 87:1-6, pl. 1 [23 April].
1936 Herbert N. Lowe. (obit.) Nautilus 50(1):28 [14 July].
1939 Land Mollusca of North America (North of Mexico). Monog. ANSP 3; vol. 1(1):i-xvii+1-573+i-ix, figs. 1-377 [6 Dec.]

RICHARDS, MARGARET CROZIER & WILLIAM E. OLD JR.
1969 A catalogue of molluscan type specimens in the Department of Living Invertebrates, The American Museum of Natural History New York, New York, U.S.A. 147 pp. [May].

ROBERTSON, ROBERT, LEONARD RICHARDSON, GEORGE M. DAVIS, ARTHUR E. BOGAN
1981 Catalogue of the types of neontological Mollusca of the Academy of Natural Sciences of Philadelphia. Tryonia 5(2):1-48, Archaeogastropoda: Pleurotomariacea, Fissurellacea, Patellacea. [1 Dec.]
1983 *Ibid.*, vol. 7(3):1-90, Archaeogastropoda: Trochacea, Trochidae, Stomatellidae [31 May]

SMITH, JUDITH TERRY
1978 Primary types in the Stanford Paleontological type collection. Bull. Amer. Paleo 72(300):317-552. [14 Mar.].

SMITH MAXWELL ed. & pub.
1912 The directory of American conchologists. 1st. ed. Hartsdale, NY (not paginated).
1914 The international directory of malacologists and conchologists. Hartsdale, NY, 23 pp. [1 Feb.].

SPHON, GALE G.
1966 Material contained in the molluscan type collection of the Santa Barbara Museum of Natural History. Veliger 9(2):244-246, [1 Oct.].

STRONG, A.M. & ELSIE CHACE
1936 Herbert Nelson Lowe. Nautilus 50(2):64-66 [29 Oct.].

WILSON, EDWARD C. & GEORGE L. KENNEDY
1967 Type specimens of Recent invertebrates (except Arachnida and Insecta) in the San Diego Natural History Museum. Trans. SDSNH 14(19):237-280, [17 Nov.].

ON THE DECKER, A SEASHELL OF EDIBLE DELIGHT

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The relatively recent rediscovery that some species of European helicid land snails were appearing in considerable numbers in southern California has aroused the interest of shell collectors. This interest has turned into consternation among agricultural authorities concerned with the effect of these ubiquitous, voracious hedge snails of Europe and the Mediterranean regions on the agricultural industry of southern California. Especially pernicious to our guardians of the production of cash food produce is the possibility that all exportation of southern California produce would be placed under ban by the remainder of the United States as well as foreign countries.

However, there is another side to this story, horrendous though it may appear. The medium-sized or large helicids of Europe and the Near East have been part of the native inhabitants of those countries for millenia. Besides the natural controls that have evolved with the spread of these snails, the human inhabitants of these same lands have learned that these potential or real pests are also a source of protein food. Thus it is that after a rainy spell when the snails come out of their hiding places or hibernation and are feeding happily on the greenery edible to humans or not, the poor people of these lands go outdoors joyously with baskets to collect the snails to supplement their otherwise poor protein diet.

The author of this small treatise has personally indulged since childhood in the consumption of such delicacies in the types of cookery common in Italy. In Naples cooked land or marine snails are sold in stalls like frankfurters and hamburgers in this country. In other southern European countries, France and Spain etc., the snails are otherwise prepared for the table. France, especially, has developed a modest business in the exportation of ready-prepared-for-eating *Helix pomatia*. You may get the empty shells as a bonus. A word of caution—since the use of pesticides here has made the "wild" land snails deadly, we can no longer eat this good source of protein unless commercially cultivated.

Marine mollusks have been commonly used by humans for food, especially in the protein poor countries of Europe and Asia. Even some north European countries (England, for example) have considered winkies (*Littorina littorea*) and the "northern buccinum" (*Buccinum undatum*) as food delicacies in addition to the cockles (*Cardium* species), scallops and clams of several kinds. Mediterranean peoples also consume mussels (*Mytilus edulis*), oysters and various muricid species as well as cephalopods (mainly squids), cuttlefish, and octupi of various species, besides sea urchins. In Italy these are called fruits of the sea and include also crustaceans such as crabs and lobsters. In the Orient with its enormous population and its relative lack of cattle, sheep, goats, etc., almost any marine organism is a potential food source. The number, in terms of species, of gastropods and bivalves eaten is considerably more than in any other geographic area.

On a recent visit to my family of three brothers, their wives and numerous offspring, I was informed that a delightful sea food new to me would be served. The promised food item was sea snails which are sold commercially in New Jersey under the common name of "Deckers." I was much puzzled as to what a Decker was until we had them raw and I recognized them as our well known eastern *Crepidula fornicata*, known under the "official" common name of "Slipper Shell." The name Decker is obviously derived from the fact that Crepidulas have a boat-like shell with a deck

extending halfway across the interior of the oval shell, hence the name Decker for deck. The uncooked meat is rather sweet and tender and is removed from the shell easily with a toothpick or small fork. The flavor is neither that of an oyster, clam or *Busycon*. Although larger species of *Crepidula* are found elsewhere, the similar Pacific *Crepidula onyx* is somewhat smaller. Another species of the eastern United States is *Crepidula plana*, found within the aperture of empty shells of *Polinices duplicata*, where it bends to fit the concave form of the aperture. It is comparatively small and is not a food product to my knowledge. Species of this genus change sex from male to female, depending on whether, in their clumping habits, they are at the bottom or the top of the heap.

CLUB NEWS

THE ANNUAL AUCTION/POTLUCK

The annual Auction/Potluck will be held on Saturday evening April 12 at the home of Mary and Ron McPeak (see map, last page). Festivities begin at 6 P.M.

This is the Club's only fundraiser and the highlight of the year. Because the committee must prepare the shells for auction and make duplicate lists of auction shells for those who attend, those members who have not already donated are urged to do so right away.

Please look into your collections now and prepare your donations for this important and exciting Club function. Specimen quality shells, with good collecting data (when possible), are requested. Bring your shells to the March meeting -- the last one before the auction. If you are unable to attend this meeting or to have your donation ready in time, contact a board member to arrange for dropoff or pickup. For out of town members, please send your auction donations to the Club address. Receipts will be provided, on request.

The phone committee, chaired by June King (296-0574), will be contacting all local members to coordinate the food for the potluck and will have information on dropoff spots for auction shells.

Remember that this is the Club's only fundraiser. It's proceeds provide the funds to publish The Festivus, to support our library, donations to scientific organizations, and our social events. We urge All, both out of town and local, to be generous and donate to the auction. And if you have nothing to donate, come to the party and BUY!!

FROM THE MINUTES - SAN DIEGO SHELL CLUB MEETING - 20 FEBRUARY 1986

Wes Farmer introduced Gregg Hamann, who presented a fantastic show on "Collecting in the Caribbean." An experienced Caribbean collector, Gregg took us from the northern Bahamian islands down through the Turks and Caicos, the Virgin Islands, the Dominican Republic, the islands of the Antilles, and finally Bonaire and Curacao. Each island area was treated separately with tips on how to collect. Gregg Hamann's well-prepared talk and slide show were augmented by an impressive, and beautifully arranged, display of specimen shells from the Caribbean. Examples of *Lyria archeri* (Angas, 1865); *Cypraea surinamensis* Perry, 1811; *Murex argo* Clench & Perez Farfante, 1945; *Conus cedonulli* Linne, 1767 and other rarities from this difficult collecting area left the audience impressed. Many Club members were heard to be considering a trip to the Caribbean where the collecting may be difficult but the rewards satisfying.

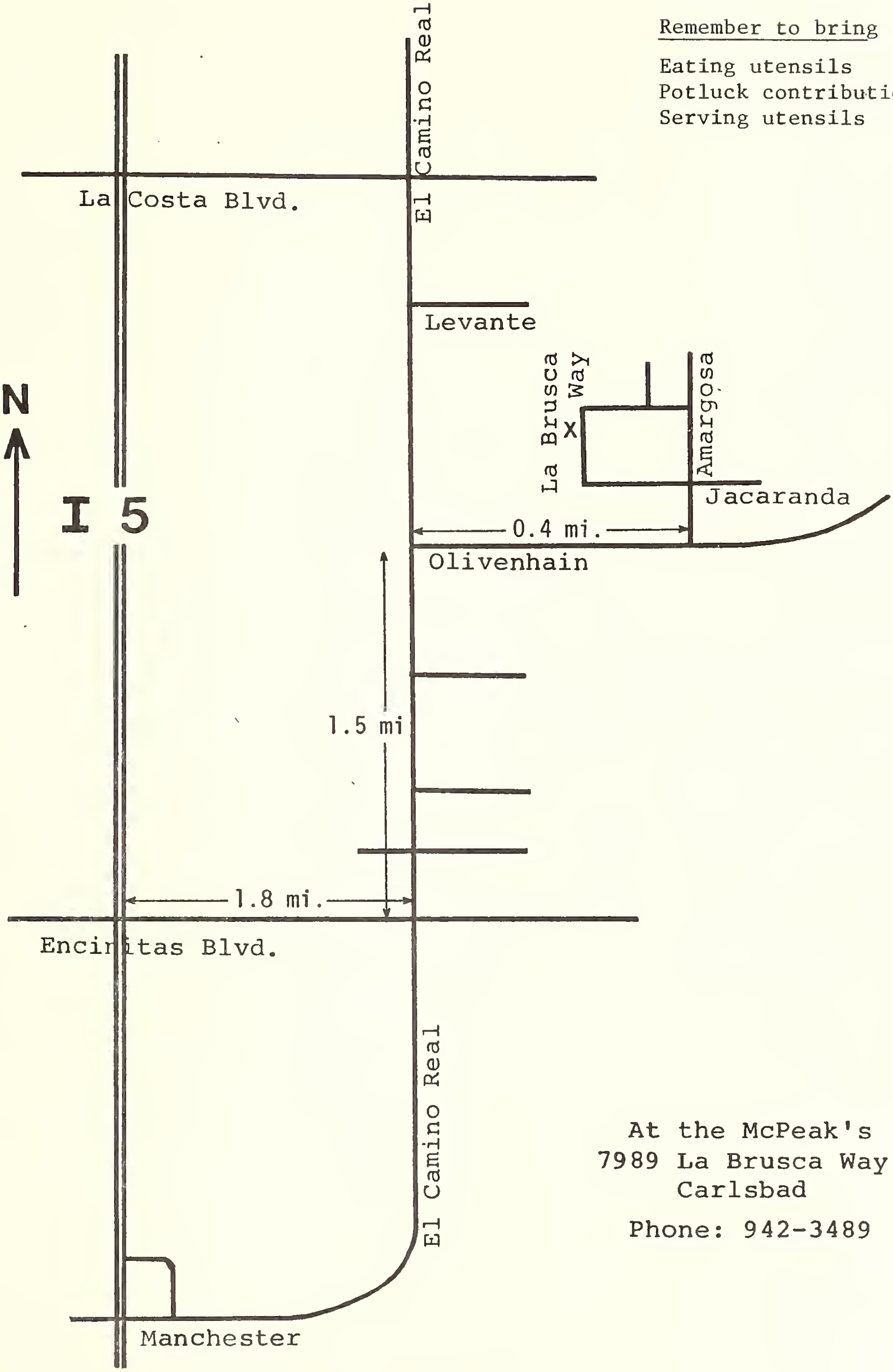
At the business meeting arrangements for the Auction were discussed. [See above and the map on last page for details]. The shell drawing was won by Marty Schuler.

Richard Herrmann

DUES ARE OVERDUE

In order to be included on the 1986 membership roster, which will be sent as part of the April issue, dues must be received by the March meeting. This will be the last issue of The Festivus for those whose dues are not paid.

Map for the Auction/Potluck--12 April 1986.
Festivities begin at 6:00 P.M.



Remember to bring

Eating utensils
Potluck contribution
Serving utensils

At the McPeak's
7989 La Brusca Way
Carlsbad
Phone: 942-3489

This map is not to scale

THE FESTIVUS
A publication of the San Diego Shell Club

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MEMBERSHIP AND SUBSCRIPTION
Annual dues are payable to San Diego Shell Club. Single member: $10.00; Family membership: $12.00 Overseas (surface mail): $12.00 Address all correspondence to the San Diego Shell Club, Inc., c/o 3883 Mt. Blackburn Ave., San Diego, CA 92111 Single copies of this issue: $5.00. Postage is additional.

Meeting date: third Thursday, 7:30 P.M. Room 104, Casa Del Prado, Balboa Park

The Festivus is published monthly except December. The publication date appears on the masthead above.

PROGRAM

Come To The Auction/Potluck
(There is no regular meeting this month)

Date: 12 April 1986

CONTENTS

ASTRAEA UNDOSA (WOOD, 1828) FROM 60 FEET — UP

BY

CAROLE M. HERTZ

Department of Marine Invertebrates, San Diego Natural History Museum, Balboa Park, P.O. Box 1390, San Diego, California 92112

On a mid afternoon low tide last November Jules and I walked at the low tide line on Tourmaline Surfing Beach in San Diego, a beach we consider partly ours since we visit it so frequently looking for washed-in grass and algae for our aquarium.

As I was bending over a tidepool, I overheard three men talking. Two, quite young who spoke with European accents, appeared to be the guests of the third (a considerably older man). The three were looking for shells and commenting on the clam valves they'd found. Just then, at my feet, I saw a very large, empty shell of *Astraea undosa*. I turned around, handed the shell to the three, and asked, "How do you like this one?" They were obviously delighted by it, especially when I said that it was theirs to keep. The older gentleman wanted to know why I didn't want the shell, and I explained that I was only interested in live ones for our aquarium. Then this same man said confidentially, "You know, I found a live one of these here today." I asked where it was and he said, "Back there." Thinking he meant farther up on the beach in the rotting kelp, I began to walk in that direction when he added, "No, it's on my dining room table." I explained that the animal would soon die there and that the smell would become more than a bit disagreeable. He replied that he knew that and felt very guilty for having taken it in the first place. He then brightened saying, "Wait here and I'll give it to you." Oh, no, don't bother," I protested. But he insisted saying, "I only live over there," and pointed to the houses on the high bluff overlooking the beach. "Look up in fifteen minutes and I'll have it for you," he said as he and his friends started toward the beach access.

Jules and I, dismissing the conversation, continued wandering down the beach awhile, poking about the rocks and tidepools. We were starting back toward the parking lot when I saw two arms signalling frantically from above. "I have it for you," I heard. "I'll drop it down to you." I couldn't believe it. There he was holding and then tossing a big paper bag which landed in the sand with a resounding thud. I ran to the just landed Vons supermarket bag and hurriedly opened it. Inside, wrapped in newspaper and plastic, was a whopping, great grandfather-sized ($111^{\pm}$ mm alt. x $130^{\pm}$ mm max. diam.) *Astraea undosa*, with operculum tightly closed. The shell hurler called down, "See! He's alive!" I shouted back, "There's an animal in there but I don't know how live it is." We waved goodbye, and Jules and I started again for the parking lot, now with our Vons' brand *Astraea undosa*.

Once at home we decided against putting the *Astraea* in our tank since we were afraid that a huge, dead specimen might cause a calamity in the 30 gallon tank in our living room. However, after two hours in a casserole dish of fresh salt water, it began to move. It is now in the aquarium where it is an imposing sight cruising, chomping, and crashing.

Astraea undosa from sixty feet—up. Certainly this is a range extension. We have watched it and other *A. undosa* in the tank feeding on a variety of washed in marine plants we bring home from the beach. They have eaten fronds of the giant kelp (*Macrocystis)* and species of laminarians and quickly consumed large fronds of "bathtowel algae" (*Gigartina)* which we had placed in the aquarium "for decoration."

REDISCOVERY OF MUREX NORRISII REEVE, 1845

BY

ANTHONY D'ATTILIO

Department of Marine Invertebrates, San Diego Natural History Museum, Balboa Park, P.O. Box 1390, San Diego, California 92112

The status of *Murex norrisii* Reeve, 1845, has remained in doubt since its description (without locality information) and illustration by Reeve in the Conchologia Iconica on plate 28, figures 129a and 129b of the section on *Murex*. It is reproduced here in Figure 1.

Because it was not known to collectors and specialists in Panamic muricids, the species remained in conchological limbo. In the 1971 edition of Sea Shells of Tropical West America by Dr. A. Myra Keen it is placed questionably, without a figure, as a synonym of *Muricanthus princeps* (Broderip, 1833) and included in her "Rejected and Indeterminate Species" as "Described without locality and the type is apparently lost. It somewhat resembles a *Murexiella* but has been identified by some authors as the young of a *Muricanthus*."

Fig. 1 *Murex norrisi* Reeve, 1845 reproduced from Conchologia Iconica, pl. 28, figs. 129a,b.

Some time ago, Carol Skoglund of Phoenix, Arizona, brought two specimens from San Pedro, Ecuador to the San Diego Natural History Museum for identification. Because I had been perusing the *Murex* portion of the "Iconica" (which I have had in my library since 1948), I was immediately able to identify the specimens (with great excitement, I may add) as *Murex norrisii* (Figures 2 and 3). Further examination of the two specimens made a tentative generic assignment possible, and it is here referred to *Murexiella*. Certain placement generically, however, remains to be determined by an examination of the radula. Unfortunately, the two specimens no longer had the soft parts.

The original description and comments by Reeve follow.*

Species 129. (Fig. *a* and *b*, Mus. Cuming.)

MUREX NORRISII. *Mur. testâ subpyriformi-ovatâ, basem versus peculiariter attenuatâ et recurvâ, transversim conspicuè costatâ et subtilissimè elevato-striatâ, spirâ breviusculâ; anfractibus supernè paululum depressis, sexfariam varicosis, varicibus frondosis, frondibus gracilibus, elegantissimè muricato-ramosis; albâ, frondibus medianis fuscis; aperturâ parvâ; canali longiusculo, ascendente.*

NORRIS'S MUREX. Shell somewhat pyriformly ovate, peculiarly attenuated and curved back towards the base, transversely conspicuously ribbed and very finely elevately striated, spire rather short; whorls a little depressed at the upper part, six-varicose, varices frondose, fronds slender, very elegantly prickly branched; white, middle fronds brown; aperture small; canal rather long, ascending.

REEVE, Pro. Zool. Soc., 1845.

Hab. ——?

I have much pleasure in dedicating this important species to Thomas Norris, Esq., in whose cabinet there is another equally characteristic specimen. The shell is most peculiarly attenuated and curved back towards the base, and the fronds are branched and ramified with remarkable sharpness and delicacy.

*Although Reeve stated in the "Iconica" that the species was described in the Proceedings of the Zoological Society of London, it never was published in that journal.

Fig. 2 Apertural view of Skoglund specimen of *Murex norrisii* Length: 40.3 mm Locality: San Pedro, Ecuador

Fig. 3. Dorsal view of specimen shown in Figure 2.

The size of the Reeve specimen, judging by the illustrations in the "Iconica," is 35 mm. The sizes of the two Skoglund specimens are: 40.3 x 27.40 mm and 29 x 22 mm. The larger specimen (Figures 2 and 3) is grayish white in color with a brown band retained only on six of the varices on the posterior portion of the body whorl. Color is lacking on the apertural varix. On the smaller specimen the brown band continues in the intervarical areas as well as on the varices although strongest on the varices. Differences observed relate to the number of varices which are seven in the two Skoglund specimens but six in Reeve's description.

Additional information noted from studying the Skoglund specimens is the character of the protoconch (Figure 4) which is of $2\frac{1}{4}$-$2\frac{1}{2}$ smooth, rounded brown whorls with small buttresses and a number of transverse cords on the teleoconch. There is one cord above the shoulder, five primary cords on the body whorl, and two primary cords on the canal; secondary interstitial cords are present on the body and the canal and three in the gap between the canal and the base of the body whorl. The entire surface of the shell both on the cords and the in-between areas, is notably scabrous, and as Reeve indicated, all transverse

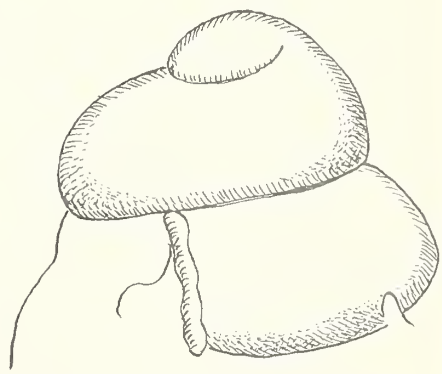

Fig. 4. Protoconch of Skoglund specimen of *Murex norrisii* shown in Figures 2 and 3, at 50x.

sculpture is, in addition, striate.

I am indebted to Carol Skoglund for making these specimens available to me for study and to David K. Mulliner for the fine photography.

A CLASSIC IS UPDATED

BETWEEN PACIFIC TIDES (Fifth Edition)
By Edward F. Rickets, Jack Calvin & Joel W. Hedgpeth
Revised by David W. Phillips 1985
Stanford University Press, 652 pages, 364 figures
Price: $22.00

Since it was first published in 1939, BETWEEN PACIFIC TIDES has become a classic in marine invertebrate literature. It is widely used by professionals and students as a reference work and it is also popular among readers interested in seashore life of the Pacific coast of the United States.

In 1948 the book was revised by the original authors, Edward R. Ricketts and Jack Calvin and subsequently in 1952, 1962, and 1968 it was revised and expanded by Joel W. Hedgpeth. Each revision brought the book up to date with the current developments in marine biology and new information on the life histories of marine organisms.

In this fifth revision, David W. Phillips (Professor of Marine Invertebrate Zoology at the University of California at Davis and the Bodega Marine Laboratory, and editor of The Veliger) has incorporated many changes and additions, expanding the fourth edition (1968) by twenty percent. A completely new chapter on ecology and distribution has been added plus 200 new photographs and drawings. He has updated the annotated systematic index and general bibliography to include over 2,300 entries. The book has been completely redesigned and reset but continues to reflect the original authors' enthusiasm for the study of tidepool life. Davis has kept the same format, describing the different habitats and the marine animals adapted to life along our Pacific coast.

This valuable new revision will extend the usefulness of BETWEEN PACIFIC TIDES as a reference work and will continue to entertain readers on the subject of marine life found along our Pacific seashores.

Barbara W. Myers

VIVIPARUS MALLEATUS (REEVE, 1863) IN THE SAN DIEGO RIVER

BY

RICHARD CERUTTI

Department of Paleontology, San Diego Natural History Museum, Balboa Park, P.O. Box 1390, San Diego, California 92124

On Sunday September 22, 1985, my brother-in-law Arthur J. Sullivan and I decided to see if we could collect some live, freshwater snails *(Viviparus malleatus)* in the San Diego River (Figure 1). I had collected a dead one near the San Diego Mission (on the west side of the San Diego River) in 1982 and had seen a Vietnamese family collecting live ones in 1983 where the river is crossed by Stadium Way (Texas Street). We went to the area of the river crossed by Stadium Way and arrived there around noon. We found a group of Vietnamese people collecting crayfish, fresh-water clams, and *Viviparus malleatus*.

I introduced myself to the group and asked them if I could buy a few of the live snails from them for the San Diego Natural History Museum. A fellow in the group named "Lang," who said he was Cambodian, gave me four snails from a bucket that had about ten snails in it which his son had collected that day. Lang was very kind and refused to take any money. I asked him how long he had been collecting the snails at that location and he said he'd collected there for over two years. I also asked him if he'd collected snails of that kind in Cambodia and he said, "Yes" and that they were very good to eat.

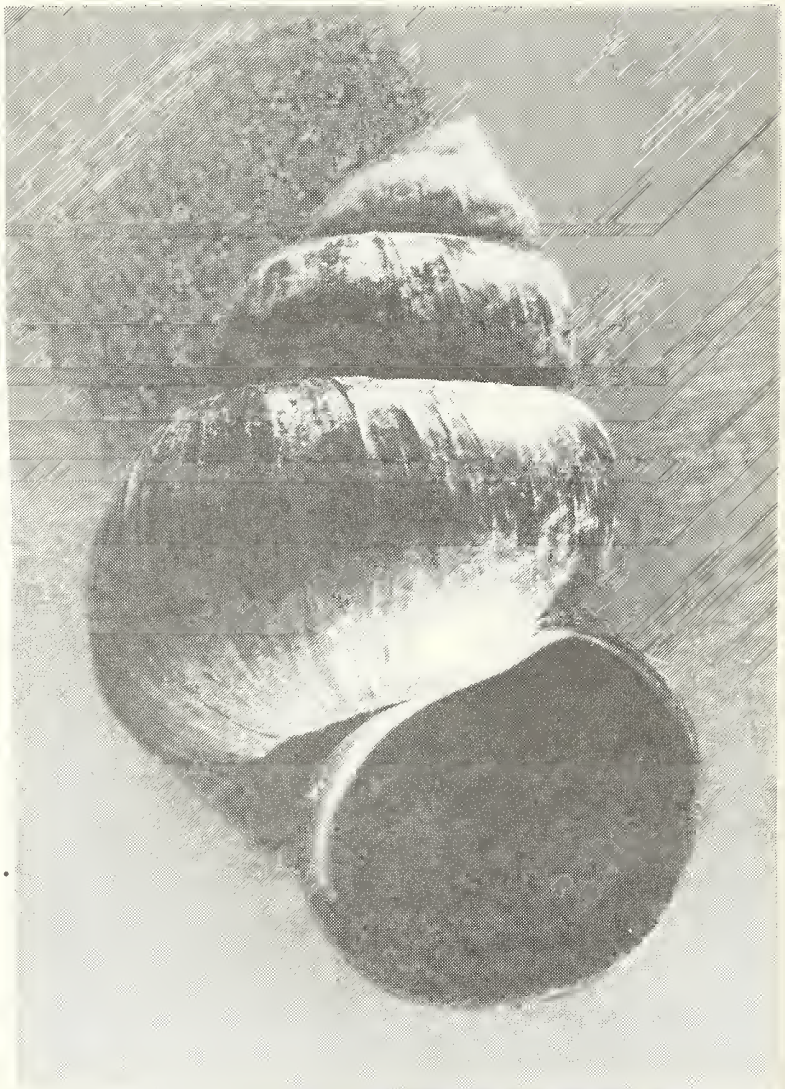

Fig. 1. *Viviparus malleatus* (Reeve, 1863) SDNHM 87470, Length: 68.5 mm Collected by Richard Cerutti in the San Diego River at Texas Street on 22 September 1985. Identified by B.W. Myers

I was able to collect three *Viviparus malleatus* there myself that day. It appeared that the snails were feeding on algae.

These snails are known as the Chinese Mystery Snail or Mystery Snail and are used widely in aquaria as well as being sold in markets in some large cities for food. They are believed to have been accidentally introduced to the United States with exotic water plants.

The animal, which has a transparent, horny, ear-shaped operculum, does not lay eggs but gives birth to live young, as the name *Viviparus* indicates. In the

book, SHELLS OF THE NEW YORK CITY AREA by Jacobson & Emerson (1961), the authors mention that "Frequently on cleaning this snail, we have discovered as many as sixty small embryos provided with a tiny operculum and ready to sally forth into their watery world."

CLUB NEWS

YOU CAN STILL COME TO THE AUCTION/POTLUCK!!

The Auction/Potluck will be held on Saturday evening April 12 at the home of Mary and Ron McPeak. If you would like to attend and need more information you can contact June King (296-0574), Carole Hertz (277-6259) or any board member.

BOTANICAL GARDEN FOUNDATION

All organizations meeting in the Casa Del Prado are members of the Botanical Garden Foundation. A representative from the Club is needed to attend the few meetings of this organization in 1986. The Foundation's annual plant sale will be held on May 24 and 25. Donations are requested from all member organizations and can be delivered to Room 104 in the Casa Del Prado on May 23. If you would like to help the Foundation but cannot deliver your donation to the Casa Del Prado, contact Carole Hertz (277-6259).

GREATER SAN DIEGO SCIENCE AND ENGINEERING FAIR

The San Diego Shell Club is again participating in the Science Fair to be held April 10-13 in the Federal Building in Balboa Park. The Club judges are Martin Schuler, Nola Michel, Carole Hertz and Jules Hertz as alternate. The winner, an upper division student, will be invited to present his/her project at a future Club meeting at which time the Club award will be presented.

AMU/WSM-1986

The Western Society of Malacologists and the American Malacological Union will be meeting jointly in Monterey, California from July 1-5. Further details and applications will be available at the next regular meeting. For further information contact WSM treasurer Margaret Mulliner.

COA CONVENTION

The 14th annual convention of the Conchologists of America will be held at Fort Lauderdale, Florida from Tuesday July 15-Saturday July 19, 1986. Further information and applications will be available at the next regular meeting.

SHELL SHOW IN INDIANAPOLIS

The 7th Midwest Regional Shell Show will be held from August 8-10, 1986 in the Glendale Mall hosted by the Indianapolis Shell Club. For further information contact Marion R. Magee, 2117 Fisher Ave., Speedway, Indiana 46224.

FROM THE MINUTES - SAN DIEGO SHELL CLUB MEETING - 20 MARCH 1986

John O'Sullivan of Scripps Institution of Oceanography gave a fascinating presentation on the parasitizing of the Pacific electric ray *Torpedo californica* by *Cancellaria cooperi*. He showed time-lapse films of the actions of the *Cancellaria* when in proximity of the ray, as well as very interesting slides revealing the snail's proboscis attached to the ventral surface of the ray. In this study the feeding habits of of a cancellarid gastropod were described for the first time. Club members were very impressed by the depth of the studies and the information which was shared by Mr. O'Sullivan. [Ed. note: Further information will appear in the May Festivus].

Dimitri Yin, son of Club member Bob Yin, narrated a slide series prepared by his father depicting Dimitri's latest adventures in Batangas, Philippines which was very well-received by the Club.

After a short business meeting with a discussion of the Auction/Potluck, the shell drawing was won by Carole Hertz.

Ginny Outwater

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Melbourne, FL 32901

Adams, Rosemary
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Auckland Institute & Museum
Ian Thwaites, Librarian
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PROGRAM

Opistobranchs of the World

Jeff Hamann, underwater photographer who has dived worldwide and photographed over 500 species of nudibranchs, will present a slide show of some of his work. His work has been published in "Underwater U.S.A." and he published the calendar titled "Nudibranchs 1985."

Meeting date: 15 May 1986

CONTENTS

WATCH YOUR LANGUAGE

BY

RUDOLF STOHLER

1584 Milvia Street, Berkeley, California 94709

Writing a paper requires a careful consideration of how the written text might be interpreted or, rather, how it could be misconstrued. This means that not only the actual words used must be carefully chosen, but also their arrangement in a sentence must be carefully made. To give an example, I have selected a sentence of 5 words: "I saw sea-otters eating abalones" (the term "sea otter" is hyphenated to indicate that it is here used as a "single" word). Adding the word "only" allows us to give several different meanings to the phrase, depending on the position of this additional word.

1) Only I saw sea-otters eating abalones.
2) I only saw sea-otters eating abalones.
3) I saw only sea-otters eating abalones.
4) I saw sea-otters only eating abalones.
5) I saw sea-otters eating only abalones.
6) I saw sea-otters eating abalones only.

This example demonstrates that the different sequences of the same words may convey different meanings; some precise and unequivocal, but some subject to two (and possibly more) different interpretations.

In our example phrases 1, 3, 5, and 6 are precise, each with a single meaning. Phrases 2 and 4 each have 2 possible interpretations and are, therefore, undesirable. In the second phrase we ask, " Do you mean that you saw no other creatures eating abalones except sea otters, or that you saw nothing else in the world but sea otters eating abalones?" Similarly, in case 4 we must ask, "Did you see no other creatures eating abalones or do you mean you saw sea otters eating nothing else than abalones?"

Of course, "only" is not the only dangerous word.

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COMMENTS ON THE PROTOCONCH IN THE MURICIDAE WITH ILLUSTRATIONS

BY

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ABSTRACT

The protoconch of a number of species representing several genera in three subfamilies of the Muricidae: Muricinae, Ocenebrinae, and Muricopsinae are studied and illustrated to determine the taxonomic significance of this morphological character at the generic and subfamilial levels.

Most of the species studied have a short, simple protoconch of one and one-half to two whorls which may indicate direct development. We have concluded that the protoconch is of limited value as a generic or subfamilial indicator, but suggest that the sharply angled, tabulate protoconch may indicate placement in Ocenebrinae or Muricopsinae. The muricid protoconch appears helpful in identification at the species level.

Introduction

The most interesting and, at the same time, most difficult task facing taxonomists working at the species and generic levels has always been the relationships of species and their assignment to a genus. The problem arises chiefly because species assigned to a genus often possess morphological characters at great variance from the generic type. Either of two solutions presents difficulties. On the one hand, only species very closely related to the generic type are to be referred to the genus. The second solution, to lessen the necessity of creating many new genera, is to include in a genus species bearing only a minimal number of taxonomic characters similar to the generic type.

In some of our recent work on Muricidae it has been difficult to delimit the parameters of a genus since a species may have some characters of one genus as well as characters of a second and yet not really fit in either. In order to determine the usefulness of the protoconch as a generic character, we reviewed some of the past and the most recent work on the biological and morphological significance of the protoconch.

Before the turn of the century, malacologists were studying the embryonic whorls of shelled gastropods. Theories regarding the importance of the protoconch as a generic character were being proposed and evidence to support these theories was being gathered. Color, number of whorls, shape (convex, concave, tabulate, bulbous, sunken, etc.), smooth or sculptured, kinds of sculpture, size, axis of coiling, etc., were mentioned as constituting differences in the protoconch. In some genera studied, the protoconch appeared uniform for all species. In many groups, considerable intrageneric variation was discovered. Information on embryonic development brought new understanding of the term protoconch.

Larval Development

A number of terms have been used in the past to describe the earliest whorls of a molluscan shell, i.e., apex, larval shell, embryonic whorls, nucleus or nuclear whorls. Smith (1945) discussed the first usage of the term protoconch and its meaning to different authors. He defined the term protoconch as "those apical whorls of a gastropod shell usually few in number, which differ in contour, sculpture, or attitude from the succeeding and more or less adult whorls."

Thiriot-Quievreux (1972) and Robertson (1976) redefined the term protoconch as the entire shell grown before metamorphosis or, in the case of direct development, before hatching. Thiriot-Quievreux (1972) originated the terms

protoconch I and protoconch II. Robertson (1976) defines protoconch I as grown by the shell gland and protoconch II as grown in the plankton by the mantle edge.

Early development for many groups of gastropods following fertilization of the ova is indirect. The numerous eggs, which are yolk thin since they only nourish the embryo for a short time, are laid in planktonic capsules, [i.e., species of Littoninidae (Bandel 1974)] and hatch at the veliger stage. The veligers live and feed in the plankton (planktotrophic) and after some time metamorphose into juveniles which usually have the shape and structure of the adult. The more primitive archaeogastropods, however, shed their eggs directly into the sea where they are fertilized externally, and hatch as trochophores, an earlier larval stage, which is then followed by the veliger stage.

In other groups of gastropods development is direct. The eggs are fewer in number and laid in more advanced and elaborate capsules of various sizes and shapes. The yolk content of these eggs is rich in order to nourish the developing embryo which will pass part, or perhaps the whole period of embryonic development, within the capsule feeding on the yolk (nonplanktotrophic or lecithotrophic). The veliger stage is suppressed and no metamorphosis occurs. The embryo hatches at the crawling stage.

Thorson (1950) suggested in his "apex theory" that it was possible to distinguish planktotrophic and nonplanktotrophic development by the protoconch, stating that a large apex pointed to nonpelagic development while a narrow twisted apex pointed to pelagic development. However, he qualified his theory by noting that a general rule valid for all species could not be given. Robertson (1976) cited exceptions in *Cymatium*, *Cypraecassis*, some *Charonia* and *Tonna*. Thorson also found that pelagic larval development among prosobranchs is wholly suppressed in the Arctic and that there is a steady increase in pelagic larvae towards the tropics. Robertson (1976) suggested that closely related species in different latitudes may differ by having pelagic or nonpelagic larvae and therefore such related species could have different kinds of protoconchs. Most species of stenoglossans, to which suborder the Muricidae belong, are nonplanktotrophic or nonpelagic and development is direct (Radwin and Chamberlain 1973; Jablonski and Lutz 1980).

Further information on larval development and protoconch size relating to mode of development is contained in Shuto (1974), Bouchet (1976), Bouchet and Waren (1979), Jablonski and Lutz (1979, 1980) and Scheltema and Williams (1983).

Protoconch Studies

Literature on protoconchs argued both for and against the protoconch as an important characteristic in establishing generic relationship.

Grabau (1902, 1904) declared it the most important character in determining genetic boundaries. In 1902 he stated, "I believe it is not too much to say that the protoconchs of all species within a given genus should agree as to their essential characteristics and that no species can be considered congeneric in which the protoconchs show a radical difference." In 1904 in his "Phylogeny of *Fusus*" he stated, "In determining genetic boundaries the most important shell feature is the protoconch." He looked at 21 species of *Fusus* [*Fusinus*] and stated, "No doubt exists in my mind of its [protoconch] relative constancy of form and characters." He described the protoconch of *Fusus* [*Fusinus*] as consisting of one and one-half volutions, smooth, obliquely erect and rather prominent, large and convex, the last half marked be vertical riblets.

Grabau (1907) admitted to the possibility that within *Fusus* there exists a variation in the number of whorls in the protoconch. difference in the size of the whorls and variation in riblets. He attributed these differences to one of degree and not of kind, and further stated, "I am not ready to admit that there is ever a difference in type in the protoconch in what can otherwise be referred to the same genus."

Grabau (1912) reiterated his theory as follows: "The gastropod protoconch is therefore a true guide to phyletic relationship and it becomes invaluable for the determination of the larger taxonomic divisions. It follows, as a natural corollary, that smaller divisions such as genera, must have all their species agree in the type of protoconch, and in consequence, the protoconch becomes the primary guide in the determination of genera, and conversely, no genus can have species with different types of protoconch, although variation within the type may be considerable."

Finlay (1931) stated, "species which do not agree in type of apex cannot be congeneric...the protoconch is one of the most valuable criteria for systematic classification...I found it [protoconch] so generally constant that in my opinion considerable importance must be placed on it in determining lineage relationships."

Kestevan (1905), however, in a discussion of the value of the protoconch as a criterion for systematic relationships concluded that the protoconch should be used in conjunction with other characters and be used in deciding systematic or generic separation if other characters are negative or unknown. He attempted to define the critical differences between protoconchs such as: 1) different types of sculpture unrelated to the adult sculpture regardless of difference of contour 2) the presence or absence of a notable or "bizarre" feature or 3) a completely different axis of coiling. Kestevan (1912), in discussing a distinct type of protoconch called the "sinusigera apex," stated that such a characteristic protoconch should prove taxonomically significant, "but not only is it not present in all members of any one genus, but occurs sporadically in at least four genera distributed over three families." Robertson (1976) showed that the sinusigera protoconch occurs in a wide variety of pelagic mesogastropods and neogastropods.

Dall (1924) stated of the sinusigera protoconch, "most species with this type of nucleus float in the larval state (planktotrophic) and sometimes reach seven whorls when normally they should have only half as many." He further stated that the variation in the sculpture of forms having a sinusigera type nucleus are probably of little more value than at the species level.

Smith (1945) concluded that in some prosobranchs the protoconchs are uniform throughout whole genera, i.e., *Busycon*, while in other groups there is substantial intrageneric and intraspecific variation , i.e., *Fasciolaria* and *Plicifusus*.

Powell (1966) illustrated several turrid protoconchs and stated, "the protoconch [in turrids] seems to be a valuable aid in the segregation of generic or subgeneric groups..." "In all likelihood, the size of the protoconch and its number of whorls are correlated with the length of the free swimming stage of the veliger."

Shuto (1974) illustrated the protoconchs of several gastropods showing general profile, shape of apex, number of volutions and sculpturing, stating that the protoconch was useful for identification at the species level and that the morphocharacters could be applied as criteria for classification at the generic or at least the subgeneric level.

Robertson (1986) stated that many groups have protoconchs showing generic characters and cited the Architectonicidae as an example. However, he added that there is no justification for distinguishing genera exclusively on protoconch differences, especially if their geographic ranges are in different latitudes.

Protoconch Differences

Dall (1890) observed great disparity in size and development of ready-to-emerge larval specimens contained in a single capsule in species of Buccinidae, *Chrysodomus* and *Volutopsis*.

Harris (1897) noted protoconch differences in the size, shape, number of whorls and attitude in *Conus*.

Kestevan (1905) cited as different kinds of protoconchs: sculpture, bizarre features and axis of coiling.

As noted earlier, Grabau (1907) did not consider size, number of whorls and

variation in the number of riblets as important characteristics, stating it was only a matter of degree.

Smith (1945) in considering species of *Ficus* considered all differences in size important. He declared almost any difference should be regarded as essential and thought any noticeable difference in size would affect the shape and proportion. He considered the following differences important in referring to types of protoconchs: 1) minute as against very large initial whorls 2) a smooth stage of one whorl against a smooth stage of two, three or four whorls 3) marked differences in the length of riblet or curved-rib stage 4) difference in proportion of the smooth and sculptured stages 5) differences in sculpture 6) differences in shape or contour 7) differences in attitude 8) differences in the axis of coiling 9) differences in the direction of coiling 10) presence or absence or marginal sinuations 11) differences in composition.

Fretter and Pilkington (1971) stated that the surface ornamentation of the larval shell is a means of identification in a number of species in *Littorina*, *Alvania*, *Rissoa*, and *Cerithiopsis*. They added that since the ornamentation is repeated in every individual it indicates genetic control.

D'Attilio (1972) illustrated the protoconchs of several species in the Coralliophilidae showing differences in size, shape, and sculpture in his effort to determine if the protoconch was of systematic value at the generic or subgeneric level. He concluded that "the protoconch was of no significant help in clarifying overall coralliophilid systematics."

Bouchet (1976) in his SEM study of abyssal larval gastropods showed differences in the protoconch of epitonid and turrid species.

Bouchet and Waren (1980) studied the northeast Atlantic Turridae. They found two types of larval shells; one with a few (1-1½) whorls which they stated indicates direct development, and one with many whorls which they consider to indicate planktotrophic development. They found differences in size, color, sculpture and number of whorls of the protoconchs within genera, i.e., *Taranis moerchi* (Malm, 1861) has a brown larval shell and *T. borealis* Bouchet and Waren, 1980, has a white larval shell. Both *T. moerchi* and *T. borealis* have direct development and only a single whorl of the protoconch. *Taranis malmi* (Dall, 1889), on the other hand, has planktotrophic larval development and a larval shell of 3½ whorls. Scanning electron micrographs of protoconchs clearly illustrated differences within genera.

Thiriot-Quievreux (1980) showed SEMs of the protoconch of *Cerithiopsis greeni* C.B. Adams, 1839, and *C. hero* Bartsch, 1911, which differ remarkably in shape, number of whorls, and ornamentation.

The Protoconch in the Muricidae

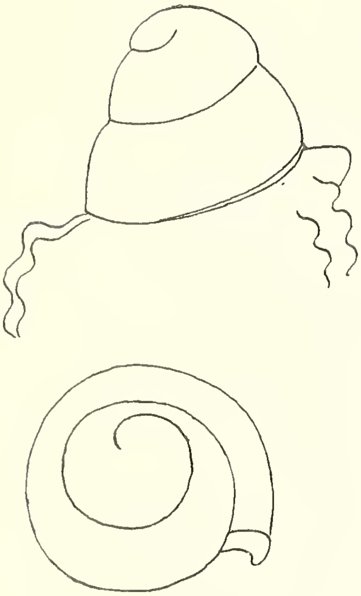
In the family Muricidae, Baker (1890) studied the protoconchs of 13 species of *Murex s.s.* and showed differences in the number and shape of the whorls. Radwin and D'Attilio (1976) found that " the [muricacean] protoconch varies widely even within a supposedly homogeneous genus, perhaps indicating differing lineages." Shuto (1983) illustrated the protoconch of several species in the genus *Murex* and discussed the paucispiral globose protoconch as it relates to distribution.

Following are illustrations of a number of protoconchs from several genera in three of the subfamilies in the Muricidae with comments on the similarities and differences. Those species listed and illustrated with no indication of source or San Diego Natural History Museum (SDNHM) number were prepared from rough drawings originally intended, but not used, to illustrate Radwin and D'Attilio (1976).

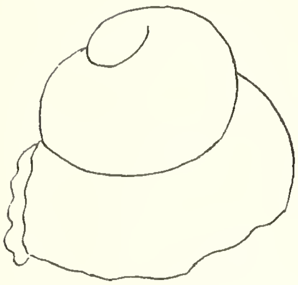
MURICIDAE

MURICINAE

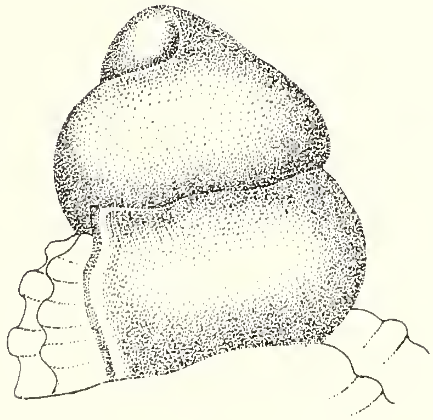
Chicoreus Montfort 1810
Type species: *Murex ramosus* Linne, 1758 [ICZN Opinion 911, 1970]



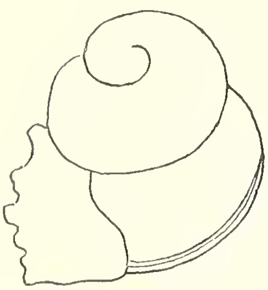
Chicoreus artemis Radwin and D'Attilio, 1976. 2-3/4 smooth, rounded conical whorls with basal cord on second whorl. SDNHM 80728.



C. axicornis (Lamarck, 1822). 2½ smooth, rounded somewhat conical whorls. SDNHM 78818.

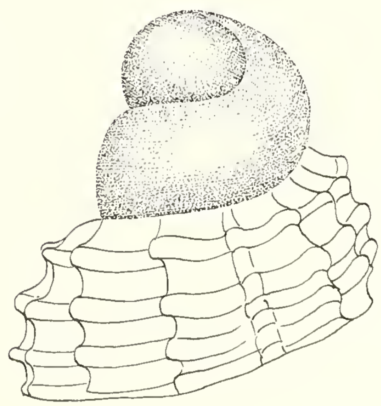


C. brevifrons (Lamarck, 1822). 2½ smooth, convex whorls of nearly equal diameter with constricted apex. From Radwin and D'Attilio (1976).



C. ramosus (Linne, 1758). 2½ smooth, rounded, slightly conical whorls with basal cord on second whorl. SDNHM 88284

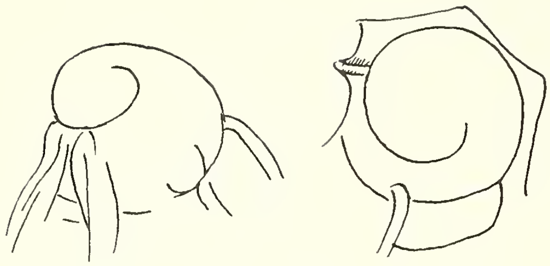
C. denudatus (Perry, 1811). 2½ rounded whorls, the second whorl with fine axial ribbing. From Radwin and D'Attilio (1976).



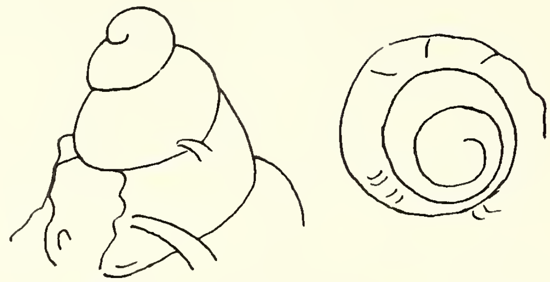
C. florifer (Reeve, 1846). 2 smooth, rounded whorls. From Radwin and D'Attilio (1976).

Dermomurex Monterosato 1890

Type species: *Murex scalarinus* Bivona-Bernardi, 1832
[= *M. scalaroides* Blainville, 1829] by original designation



D. myrakeenae (Emerson and D'Attilio, 1970). 1½ smooth, rounded whorls with buttresses. SDNHM 62512.

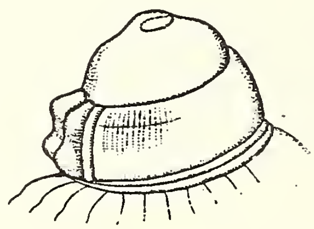


Dermomurex obeliscus (A. Adams, 1853). 3 smooth conical whorls. SDNHM 51224.

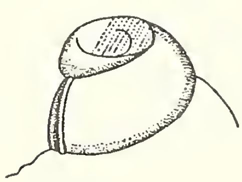
Hexaplex Perry, 1811

Type species: *Hexaplex foliacea* Perry, 1811
[= *Murex cichoreum* Gmelin, 1791] by subsequent designation, Iredale, 1915

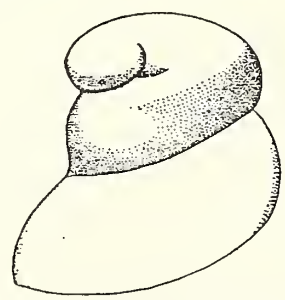
Hexaplex cichoreum (Gmelin, 1791). 1½ smooth, equal diameter whorls almost tabulate with spire somewhat sunken and with buttresses. SDNHM 76674.



H. fulvescens (Sowerby, 1834). 3 convex whorls with fine axial grooves. SDNHM 81620. From D'Attilio and Myers (1984).



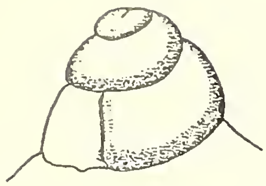
H. kusterianus (Tapparone-Canefri, 1875). Number of whorls undetermined, smooth and convex SDNHM 78106. From D'Attilio and Myers (1984).



H. rileyi D'Attilio and Myers, 1984. 2-1/3 smooth somewhat tabulate whorls of equal diameter. SDNHM 81617b. Paratype. From D'Attilio and Myers (1984).

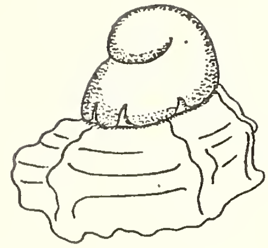
Homalocantha Morch, 1852

Type species: *Murex scorpio* Linne, 1758, by monotypy

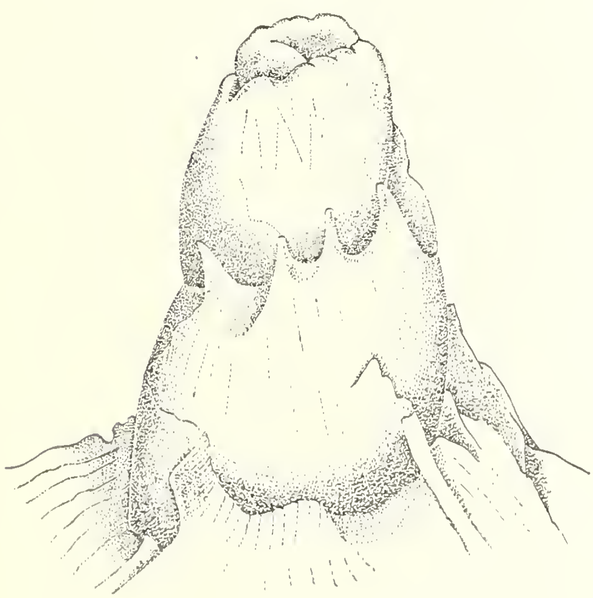


Homalocantha oxyacantha (Broderip, 1833). $2\frac{1}{2}$ conical whorls with no buttresses. SDNHM 81654. From D'Attilio (1983a).

H. scorpio (Linne, 1758). $1\frac{1}{2}$ smooth, rounded whorls with small buttresses. C. Glass and R. Foster collection



H. secunda (Lamarck, 1822). $1\frac{1}{2}$ smooth, rounded whorls with small buttresses. SDNHM 81743. From D'Attilio (1983b).

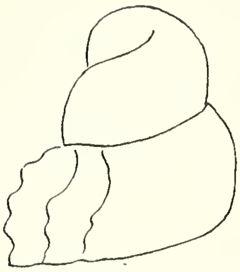


H. pele (Pilsbry, 1918). The protoconch cannot be distinguished from the spire and the apex appears depressed and undulate. SDNHM 79343. From Radwin and D'Attilio (1976).

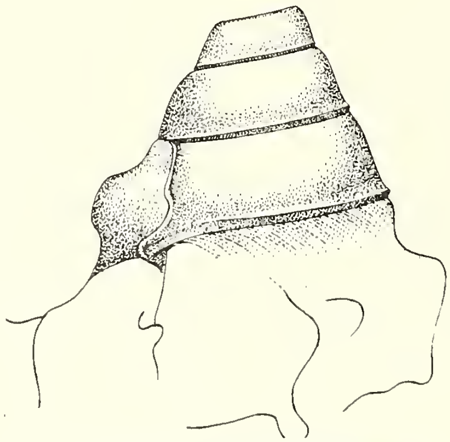
H. zamboi (Burch and Burch, 1960). $1\frac{1}{2}$ smooth, rounded whorls separated from the spire by a very fine line. June King collection.

Murex Linne, 1758

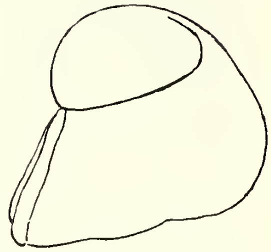
Type species: *Murex pecten* Montfort, 1810 [not Lightfoot, 1786] [= *M. tribulus* Linne, 1758], by subsequent designation



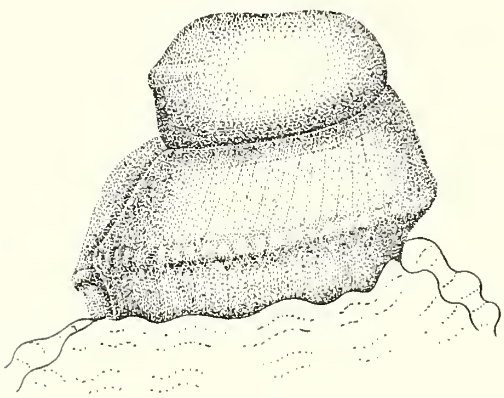
Murex bobyini Kosuge, 1983.
2½ smooth, well-rounded whorls.
SDNHM 81683.



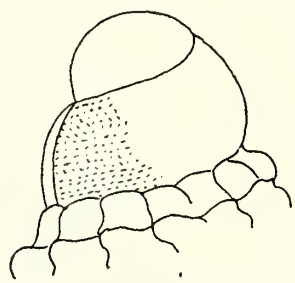
M. coppingeri E. A. Smith, 1884.
3 smooth, conical whorls, apex depressed. From Radwin and D'Attilio (1976).



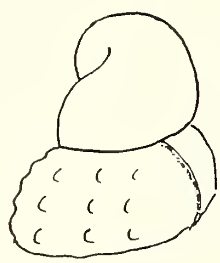
M. elenensis Dall, 1909.
1½ smooth, well-rounded whorls. SDNHM 23157.



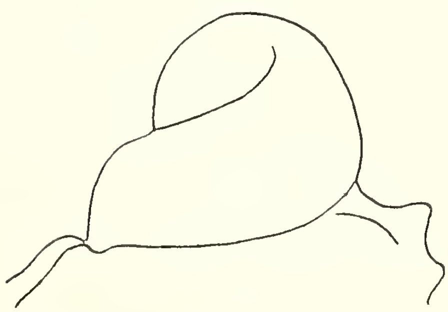
M. donmoorei Bullis, 1964.
2½ horn-colored whorls with a median beaded cord. From Radwin and D'Attilio (1976).



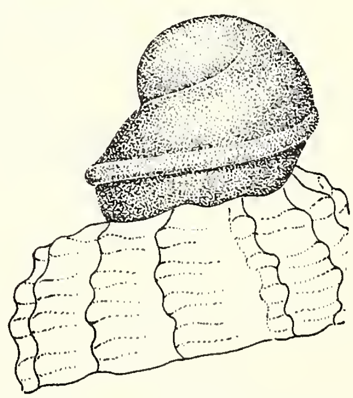
M. messorius Sowerby, 1841.
1½ rounded, papilose whorls.
SDNHM 24126.



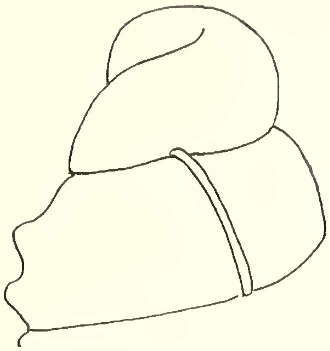
M. kiiensis Kira, 1959. 2¼ smooth, well-rounded whorls.
SDNHM 79081.



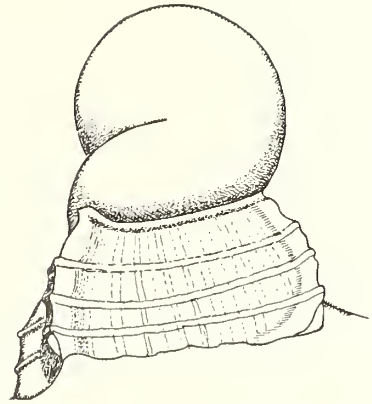
M. mindanaoensis Sowerby, 1841.
1-3/4 smooth polished, rounded whorls. SDNHM 76673.



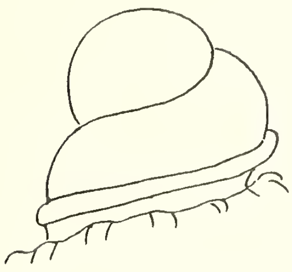
M. multiplicatus Sowerby, 1895.
2½ convex whorls with a median cord. From Radwin and D'Attilio (1976).



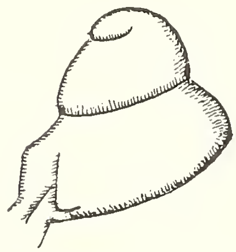
M. pecten Lightfoot, 1786. 2½ smooth, rounded whorls. SDNHM 20060.



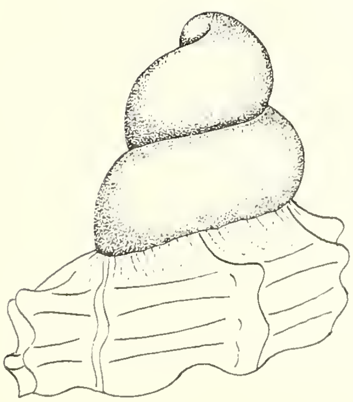
M. purdyae Radwin and D'Attilio, 1976. 1½ mammilate whorls. Holotype, SDNHM 63024. From Radwin and D'Attilio (1976).



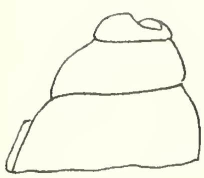
M. sobrinus A. Adams, 1863. 2¼ well-rounded whorls with a submedian cord on the second whorl. SDNHM 2479.



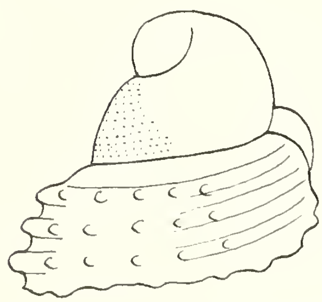
M. trapa Röding, 1798. 2¼ smooth, conical whorls. SDNHM 79047.



M. tribulus Linne, 1758. 2½ convex whorls with small abrupt apex. From Radwin & D'Attilio (1976).



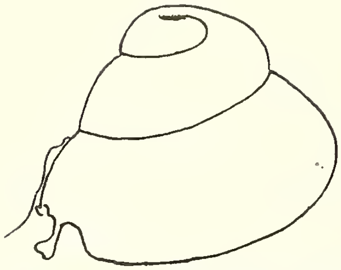
M. troscheli Lischke, 1868. 2½ conical whorls, apex slightly damaged. SDNHM 84635.



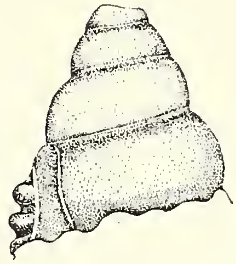
M. tryoni Hidalgo, 1880. 2¼ rounded minutely granulose whorls. E. Vokes collection.

Muricanthus Swainson, 1840

Type species: *Murex radix* Gmelin, 1791. (ICZN Opinion 888, 1969)



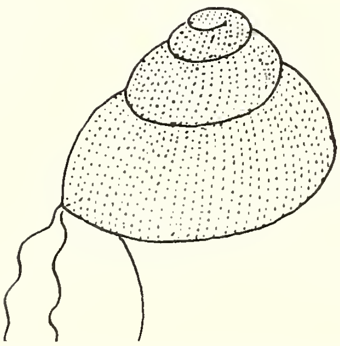
Muricanthus radix (Gmelin, 1791). 2-3/4 conical whorls. SDNHM 68401.



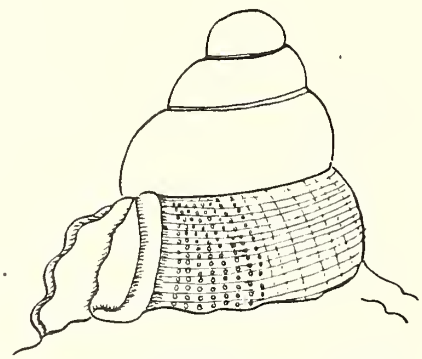
M. varius (Sowerby, 1834). 3-3½ conical whorls, apex depressed. From Radwin and D'Attilio (1976).

Phyllonotus Swainson, 1833

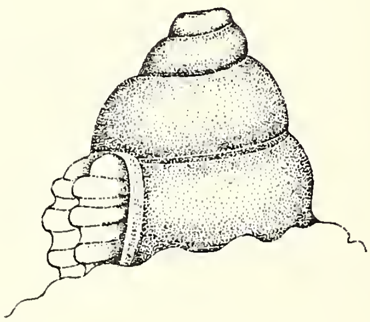
Type species: *Murex imperialis* Swainson, 1833
[= *M. margaritensis* Abbott, 1958] by subsequent designation, Swainson, 1833



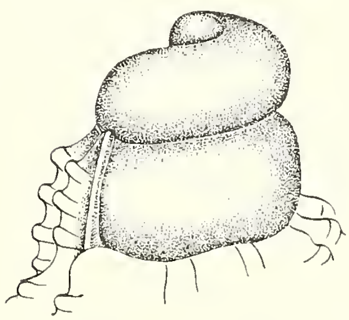
Phyllonotus brassica (Lamarck, 1822). 3½ conical papilose whorls. SDNHM 64198



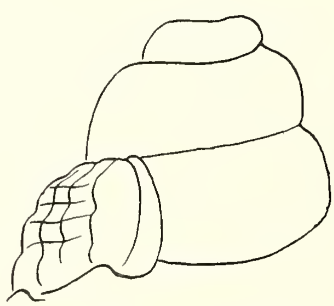
P. erythrostomus (Swainson, 1831). 3 plus conical whorls with spiral sculpture and beading on all whorls.



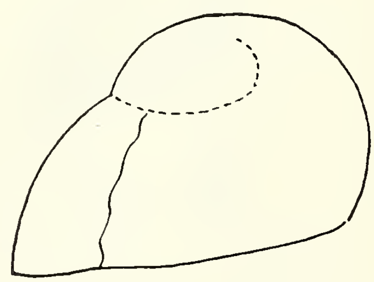
P. peratus Keen, 1960. 3 plus conical whorls with papillae, apex depressed. From Radwin and D'Attilio (1976).



P. pomum (Gmelin, 1791). 2½ whorls of equal diameter rapidly expanding from small apex. From Radwin and D'Attilio (1976).



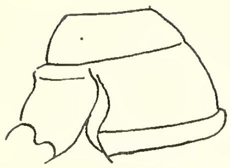
P. regius (Swainson, 1821). 2¼ to 2½ convex whorls, apex sunken.



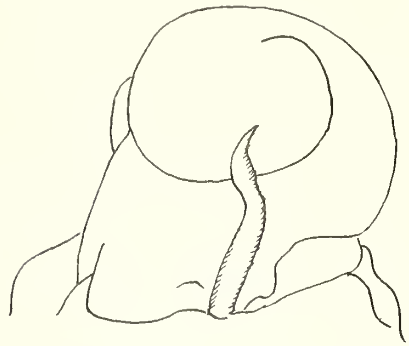
P. trunculus (Linne, 1758). 1½ rounded whorls.

Pterynotus Swainson, 1833

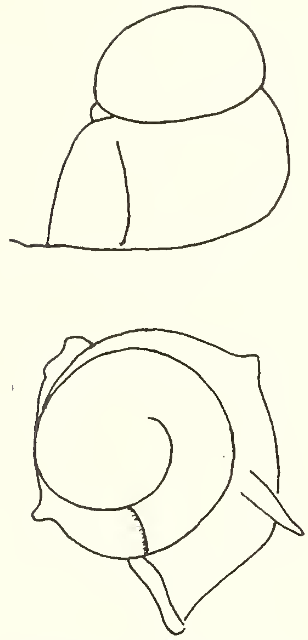
Type species: *Murex pinnatus* Swainson, 1822, by subsequent designation



Pterynotus aparrii D'Attilio and Bertsch, 1980. Two plus smooth conical whorls, apex damaged. SDNHM 88275.

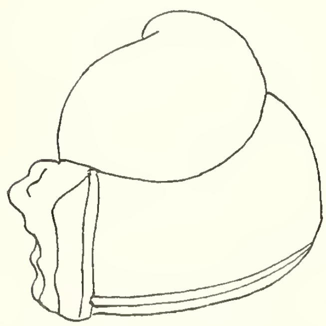


P. bednalli (Brazier, 1878). 1½ equal diameter, smooth whorls, somewhat tabulate, with buttresses. SDNHM 82954.



P. bushae Vokes, 1970. 1½ smooth, polished, rounded to slightly tabulate whorls. SDNHM 62755.

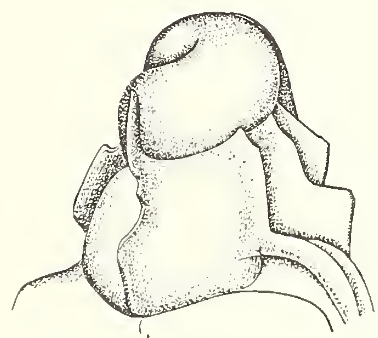
P. miyokoae Kosuge, 1979. 2½ smooth slightly mammillate whorls. SDNHM 82290.



P. orchidiflorus Shikama, 1973. 2 smooth convex whorls with basal cord on last half of whorl. SDNHM 85035.

P. pellucidus (Reeve, 1845). 3½ smooth conical whorls. SDNHM 81695.

P. pinnatus (Swainson, 1822). Apex broken, 2 plus smooth, rounded whorls. SDNHM 78194.

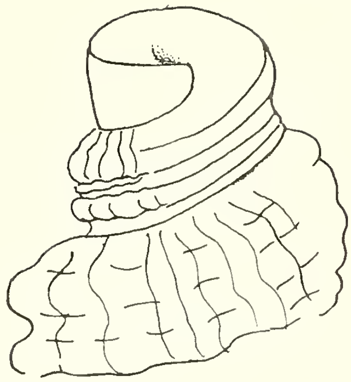


P. vespertilio (Kira, 1959). 1 convex, smooth whorl with sharp buttresses. From Radwin and D'Attilio (1976).

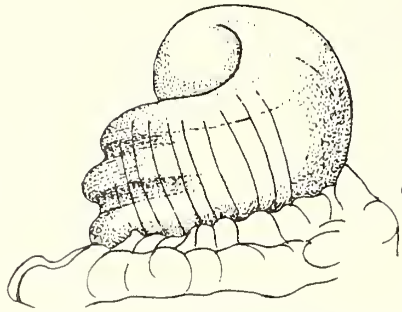
OCENEBRINAE

Ocenebra Gray, 1847

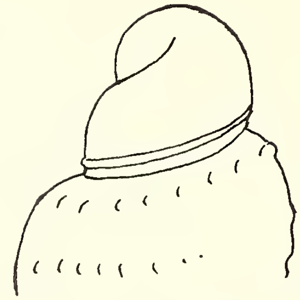
Type species: *Murex erinaceus* Linne, 1768, by monotypy



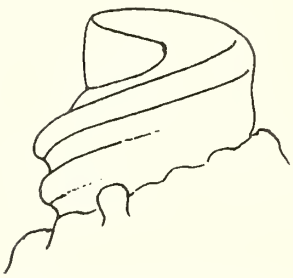
Ocenebra atropurpura Carpenter, 1865. 1½ sharply angled tabulate whorls with 2 prominent cords, apex sunken. SDNHM 88791



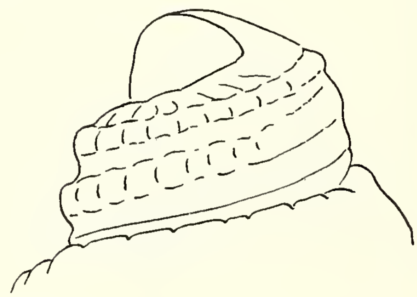
O. circumtexta (Stearns, 1871). 1½ rounded whorls with fine axial striations and a median and basal cord.



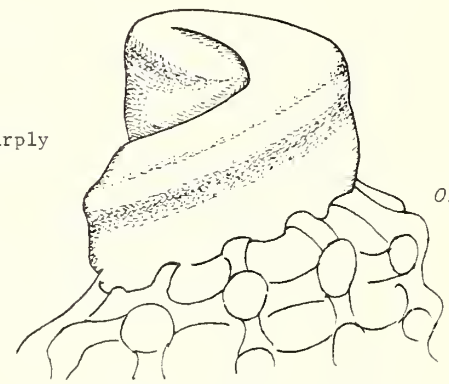
O. erinaceus (Linne, 1758). 2½ smooth, rounded whorls with very fine basal cord on last whorl. Hertz collection.



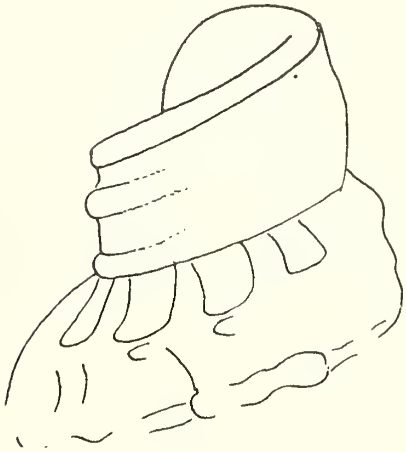
O. foveolata (Hinds, 1844). 1½ sharply angled tabulate whorls with shoulder and median cord. B. Myers collection.



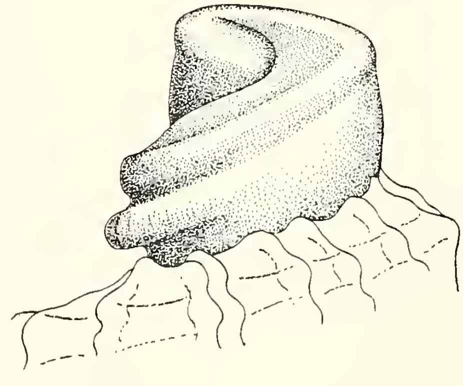
O. grippi (Dall, 1911). 1½ angled tabulate whorls with beaded median and shoulder cords. B. Myers collection. From Myers and D'Attilio (1981).



O. gracillima (Stearns, 1871). 1½ tabulate whorls.



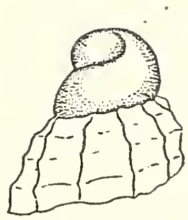
O. lurida (Middendorff, 1848). 1¼ sharply angled tabulate whorls with shoulder, median and basal cord. SDNHM 53123.



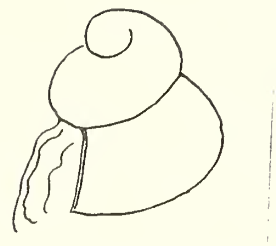
O. seftoni Chace, 1958. 1½ tabulate whorls with prominent, projecting median cords. From Radwin and D'Attilio (1976).

Pteropurpura Jousseaume, 1880

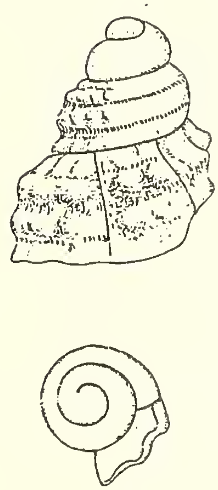
Type species: *Murex macropterus* Deshayes, 1839, by original designation

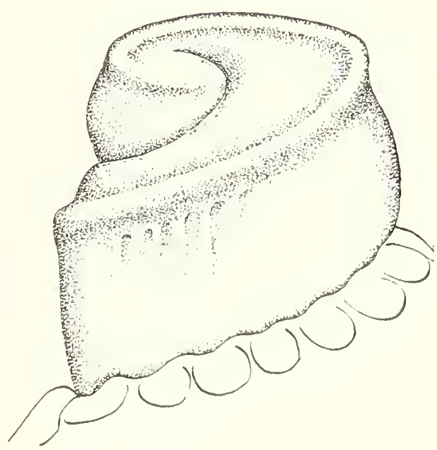


Pteropurpura bequaerti (Clench and Perez Farfante, 1945). 1½ smooth, rounded whorls. AMNH 167186. From D'Attilio and Myers (1983a).

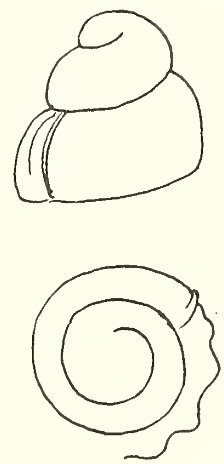


P. centrifuga (Hinds, 1844). 2¼ smooth, convex whorls. SDNHM 80775.





P. modesta (Fulton, 1936). 1½ sharply angled tabulate straight sided whorls with fine axial striations, with strong cord at shoulder, apex sunken. From Radwin and D'Attilio (1976).



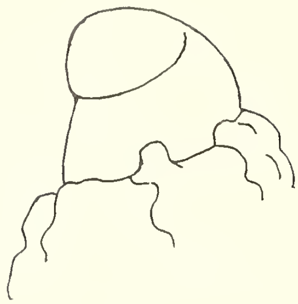
P. macroptera (Deshayes, 1839). 2½ smooth conical whorls with two weak cords on second whorl. B. Myers collection. From D'Attilio and Myers (1983b).

P. trialata (Sowerby, 1934). 2¼ smooth, conical whorls. SDNHM 76782.

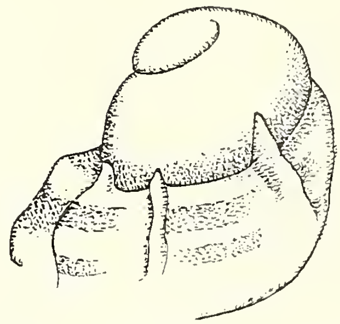
MURICOPSINAE

Favartia Jousseaume, 1880

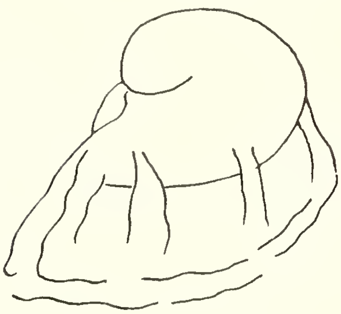
Type species: *Murex breviculus* Sowerby, 1834, by original designation



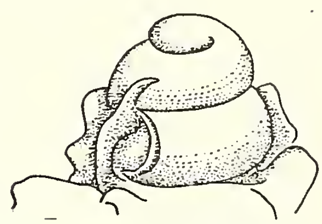
Favartia balteata (Sowerby, 1841). 1½ rounded whorls. J. King collection.



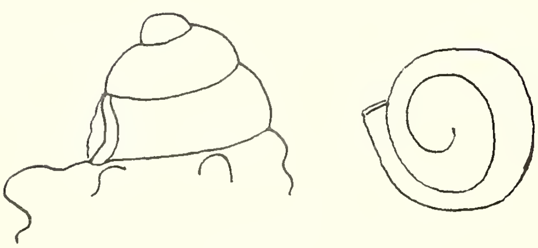
F. brevicula (Sowerby, 1834). 1½ smooth, rounded whorls with buttresses. SDNHM 76669.



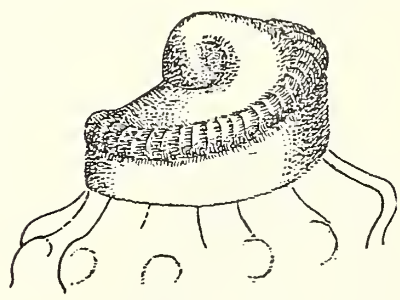
F. cellulosa (Conrad, 1846). 1¼ smooth, rounded whorls with buttresses. SDNHM 81258.



F. dorothyae Emerson and D'Attilio, 1979. 2¼ smooth, rounded whorls with buttresses. SDNHM 82298. From D'Attilio (1980).



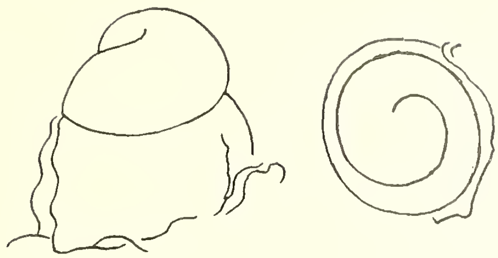
F. jeanae Bertsch and D'Attilio, 1980. 2½ smooth, conical whorls. Paratype SDNHM 78429.



F. planilirata (Reeve, 1845). 1½ sharply angled tabulate whorls with scaly peripheral cord. SDNHM 61857

Murexiella Clench and Pérez Farfante, 1945

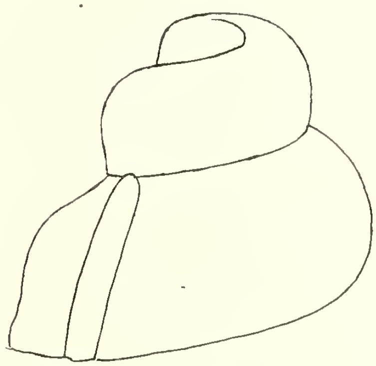
Type species: *Murex hidalgoi* Crosse, 1869, by original designation



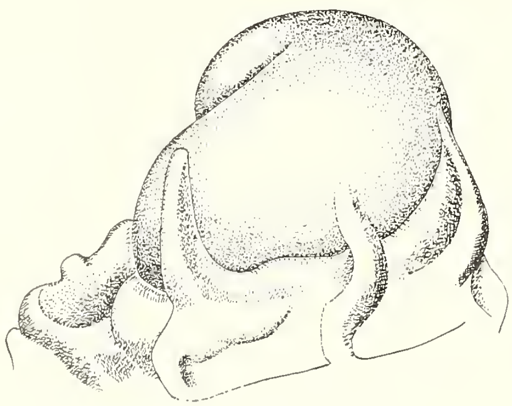
Murexiella cirrosa (Hinds, 1844). 2 smooth whorls of nearly equal diameter. SDNHM 88553

M. judithae D'Attilio and Bertsch, 1980. 2½ rounded whorls with buttresses. SDNHM 83266

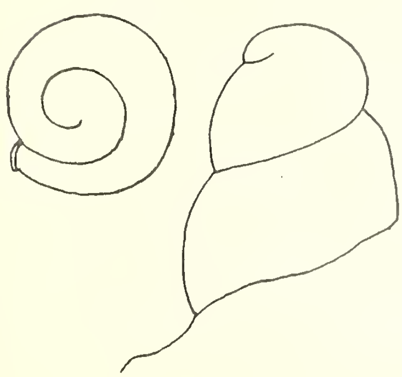
M. leonae D'Attilio and Myers, 1985. 2¼ blunt convex whorls. Paratype D, SDNHM 85105. From D'Attilio and Myers (1985a).



M. diomedaea (Dall, 1908). 2½ somewhat tabulate whorls. SDNHM 85903.



M. macgintyi (M. Smith, 1938). 1½ smooth, rounded whorls with buttresses. From Radwin and D'Attilio (1976).



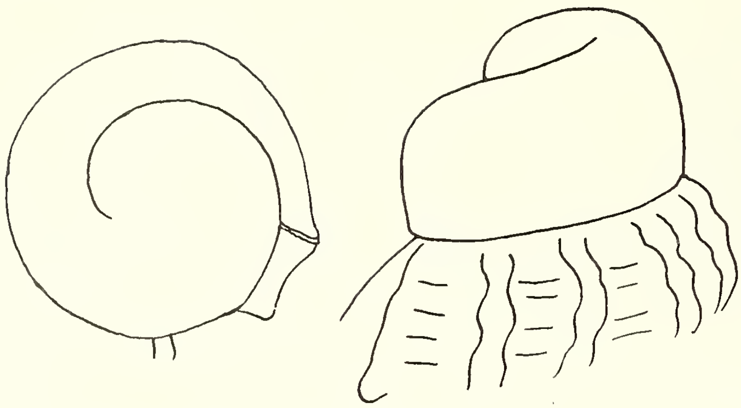
M. martini Shikama, 1977. 2¼ smooth whorls of equal diameter. SDNHM 84440.

M. peregrina Olivera, 1980. 2¼ smooth conical whorls. SDNHM 80741.

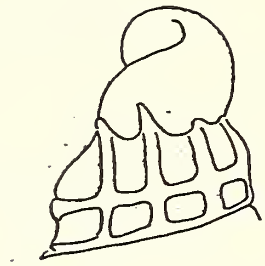
M. rosamiae D'Attilio and Myers, 1985. 3¼ smooth conical whorls. Paratype B, SDNHM 82288. From D'Attilio and Myers (1985a).

Murexsul Iredale, 1915

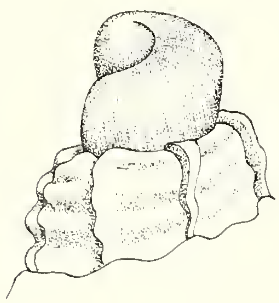
Type species: *Murex octogonus* Ouoy and Gaimard, 1833, by original designation



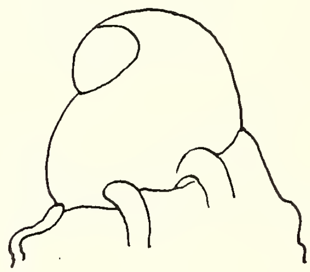
Murexsul cuvieriensis Finlay, 1927. 1½ somewhat tabulate smooth whorls. SDNHM 78645.



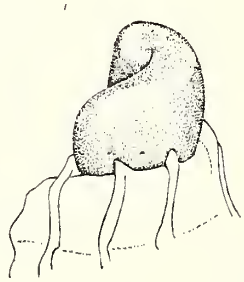
M. interserratus (G. B. Sowerby II, 1879). 1½ smooth, rounded whorls with buttresses. Holotype, Museum National d'Histoire Naturelle, Paris. From D'Attilio and Myers, (1985b).



M. kieneri (Reeve, 1845). 1½ tabulate, smooth whorls with buttresses. From Radwin and D'Attilio (1976).



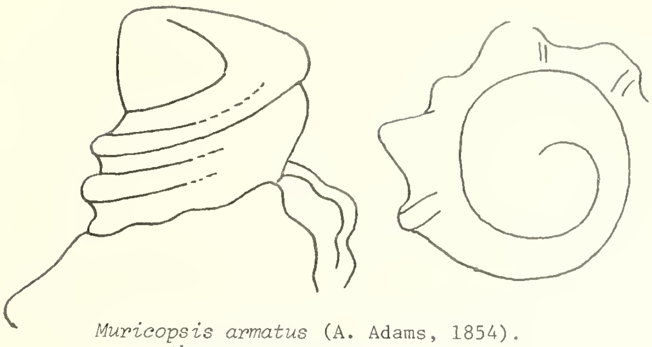
M. multispinosus (Sowerby, 1904). 1-3/4 smooth polished convex whorls. SDNHM 24154



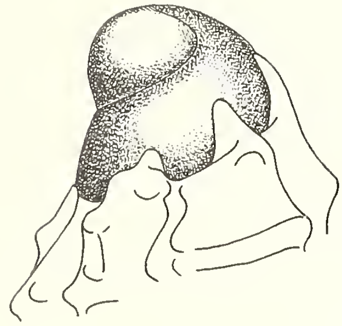
M. octogonus (Quoy and Gaimard, 1833). 1½ tabulate, smooth whorls. From Radwin and D'Attilio (1976).

Muricopsis Bucquoy and Dautzenberg, 1882

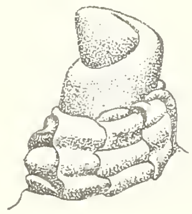
Type species: *Murex blainvillei* Payraudeau, 1826, by original designation



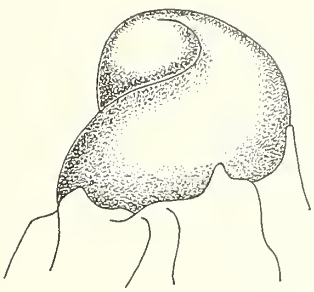
Muricopsis armatus (A. Adams, 1854). 1½ sharply angulate whorls with shoulder and median cords. SDNHM 22740.



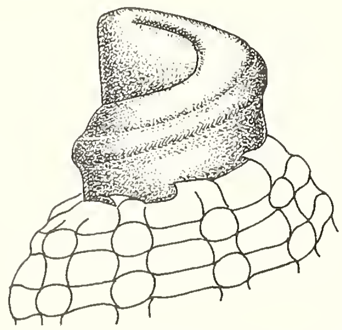
M. blainvillei (Payraudeau, 1826). 1½ rounded whorls with buttresses. SDNHM 78031.



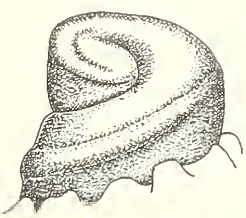
M. jaliscoensis Radwin and D'Attilio, 1970. 1½ sharply tabulate whorls straight sided. From Radwin and D'Attilio (1976).



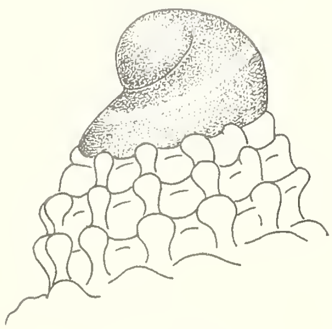
M. cristatus (Brocchi, 1814). 1½ rounded whorls with small buttresses.



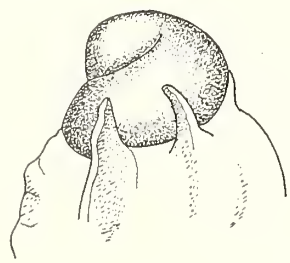
M. pauxillus (A. Adams, 1854). 1½ tabulate whorls with shoulder cord. SDNHM 51592. From Radwin and D'Attilio (1976).



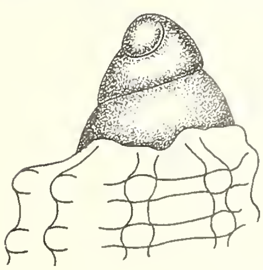
M. roseus (Reeve, 1846). 1½ tabulate whorls with median cord. From Radwin and D'Attilio (1976).



M. schrammi (Crosse, 1863). 1¼ somewhat angled whorls. From Radwin and D'Attilio (1976).



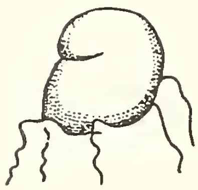
M. tulensis Radwin and D'Attilio, 1976. 1½ rounded whorls with buttresses. SDNHM 61232. From Radwin and D'Attilio (1976).



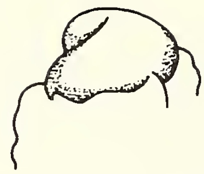
M. zeteki Hertlein and Strong, 1951 3 conical smooth whorls. SDNHM 51585.

Pygmaepterys Vokes, 1978

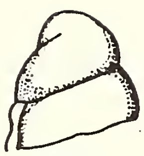
Type species: *Murex alfredensis* Bartsch, 1915, by original designation



Pygmaepterys bellini D'Attilio and Myers, 1985. 1½ smooth convex whorls. Holotype, SDNHM 83065. From D'Attilio and Myers (1985).



P. funafutiensis (Hedley, 1899). 1½ low, depressed whorls. D. Pisor collection. From D'Attilio and Myers (1985c).



P. philcloveri (Houart, 1984). 1-3/4 conical whorls. SDNHM 83068. From D'Attilio and Myers (1985c).

COMMENTS ON THE PROTOCONCH ILLUSTRATIONS

MURICINAE

CHICOREUS (p. 59)

In all of the six species of *Chicoreus* pictured, the protoconch is smooth and convex with the exception of *C. denudatus* which has fine axial striae on the second whorl. The number of the nuclear whorls differ, however. *C. axicornis, C. brevifrons, C. denudatus* and *C. ramosus* (type of the genus) have two and one-half nuclear whorls; *C. florifer* has two and *C. artemis* has two and three-fourths. *C. ramosus* and *C. artemis* both have a basal cord on the second whorl.

DERMOMUREX (p. 60)

The two *Dermomurex* illustrated show two distinctly different protoconchs. *D. myrakeenae* has one and one-half smooth, rounded whorls and *D. obeliscus* has three whorls that are smooth and conical.

HEXAPLEX (p. 60)

In the four species of *Hexaplex* figured, the protoconchs all appear different: *H. cichoreum*, the type of the genus, has only one and one-half nuclear whorls with buttresses, *H. fulvescens* has three convex whorls with fine axial grooves, *H. kusterianus* has smooth convex whorls, but the number of the whorls could not be determined. *H. rileyi* has two and one-third smooth somewhat tabulate whorls of equal diameter.

HOMALOCANTHA (p. 61)

H. scorpio, the type of the genus, and *H. secunda* are somewhat similar with one and one-half rounded smooth whorls with small buttresses. *H. oxyacantha* has two and one-half conical whorls with no buttresses. In *H. pele* and *H. zamboi* the sculpture of the spire is similar, but in the specimen of *H. pele* studied the apex is depressed and the protoconch cannot be distinguished from the spire. In *H. zamboi* the apex is of one and one-half smooth rounded whorls separated from the spire by a very fine line.

MUREX (pp. 62-63)

The variety of protoconchs represented in the genus *Murex s.s.* seems a convincing argument that the protoconch alone is of little use as a generic character. *M. coppingeri, M. trapa* and *M. troscheli* have conical whorls. *M. purdyae* has mammillate whorls. *M. sobrinus* is papillose with a median cord, and a median cord is also found in *M. multiplicatus* and in *M. donmoorei* this cord is weakly beaded and the second whorl is axially striate. *M. bobyini, M. elenensis, M. kiiensis, M. tribulus, and M. pecten* (the type of the genus) all have one and one-half to two and one-half simple rounded whorls.

MURICANTHUS (p. 64)

Although *M. radix* (the type of the genus) and *M. varius* appear similar, the number of whorls differ, two and three-fourths for *M. radix* and three and one-half for *M. varius*.

PHYLLONOTUS (p. 64)

Three species of *Phyllonotus* (*P. brassica, P. erythrostomus* and *P. peratus*) have protoconchs with three to three and one-half whorls and some type of papillae. *P. trunculus* has a short protoconch of one and one-half rounded whorls. *P. regius* has a sunken apex and *P. pomum* has two and one-half somewhat tabulate whorls.

PTERYNOTUS (p. 65)

Although *P. vespertilio* and *P. bednalli* have rounded protoconchs with about one and one-half whorls, they also have buttresses. *P. miyokoae* and *P. orchidiflorus* though similar with one and one-half whorls, do not have buttresses. *P. aparrii* appears conical with at least two nuclear whorls and *P. pinnatus* has three weakly convex whorls.

OCENEBRINAE

OCENEBRA (p. 66)

All the protoconchs represented here for *Ocenebra* are similar, having one to one and one-half sharply angled, tabulate whorls containing one or more cords, with the exception of *O. erinaceus* (the type of the genus) which has two and one-half rounded whorls with a thin basal cord.

PTEROPURPURA (p. 67)

The tabulate protoconch of *Pteropurpura modesta* contrasts notably with the rounded whorls of *P. bequaerti, P. centrifuga, P. trialata* and *P. macroptera* (the type of the genus).

MURICOPSINAE

FAVARTIA (p. 68)

F. planilirata has a sharply angled tabulate protoconch with a scaly cord at the shoulder, differing markedly from *F. balteata, F. cellulosa* and *F. brevicula* (the type of the genus). These three species have one and one-quarter to one and one-half whorls that are smooth and rounded with buttresses. *F. dorothyae* has two and one-quarter whorls similar to *F. brevicula, F. balteata* and *F. cellulosa*. *F. jeanae* has two and one-half smooth conical whorls without buttresses.

MUREXIELLA (p. 69)

M. macgintyi has a very short (one and one-half whorls) simple protoconch with strong buttresses. *M. judithae* is similar but has two whorls. *M. leone* and *M. peregrina* have two and one-quarter whorls but differ somewhat in convexity. *M. diomedaea* has two and one-half somewhat tabulate whorls while *M. martini* and *M. cirrosa* have whorls of equal diameter.

MUREXSUL (p. 69)

Murexsul interserratus and *M. multispinosus* have short, smooth, rounded whorls with buttresses. *M. curieriensis, M. kieneri* and *M. octogonus* (the type of the genus) all have short one and one-half somewhat tabulate whorls.

MURICOPSIS (p. 71)

The type of the genus, *M. blainvillei*, has a simple, short protoconch of one and one-half rounded whorls with buttresses, as does *M. cristatus* and *M. tulensis*. *M. zeteki* has a protoconch of three smooth conical whorls. *M. armatus, M. pauxillus* and *M. roseus* have sharply angled tabulate protoconchs with a strong cord at the shoulder; *M. armatus* has an additional median cord. *M. jaliscoensis*, although sharply angled, has no shoulder cord. The short protoconch of *M. schrammi* is only slightly angled.

PYGMAEPTERYS (p. 72)

P. bellini has one and one-half smooth convex whorls, while in *P. funafutiensis* the whorls are low and depressed. *P. philcloveri* has one and three-quarters smooth somewhat conical whorls.

Conclusions

The Muricidae, overall, appear to have a rather short, simple protoconch of one and one-half to two whorls with a few having three to three and one-half whorls. The nuclear characters range from rounded or convex whorls to sharply angled tabulate whorls, some smooth and polished, others minutely granulose or papillose and still others with one, two, or three strong cords and a few with axial markings. In a few the apex is depressed and several have a prominent apex. Often there are buttresses on the last whorl.

In the three subfamilies studied and illustrated in this paper, most species have one and one-half to two whorls which may indicate direct development (Bouchet and Waren 1980). Further investigation of those few species in this study with

three to three and one-half nuclear whorls, i.e., *Murex coppingeri*, *Muricanthus varius*, *Phyllonotus brassica*, *P. erythrostomus*, *P. peratus*, *Pterynotus pellucida*, may reveal a short planktotrophic larval development (Bouchet and Waren 1980).

Separation of the three subfamilies studied cannot be made on the protoconch character alone. However, we did note that in the Muricinae the nuclear whorls of the species studied appear mostly rounded to slightly tabulate, but none are sharply tabulate or have a shoulder cord as in Ocenebrinae and Muricopsinae. Further study may reveal a sharply tabulate protoconch among the Muricinae. Ocenebrinae and Muricopsinae have protoconchs with rounded whorls as well as sharply angled tabulate whorls.

Separation of the genera based on protoconch characters alone cannot be made. The only developing pattern seemed to be in *Ocenebra* in which all the species figured show a rather similar sharply angled tabulate protoconch with the exception of the type species *O. erinaceus* which has smooth rounded whorls.

Therefore, other than the possibility that the sharply angled tabulate protoconch may indicate either Ocenebrinae or Muricopsinae relationship, the protoconch is of doubtful value as a generic or subfamilial indicator.

While the taxonomic significance at the supraspecific level is limited, this morphological character does provide important information regarding larval life and is helpful in identification at the species level.

ACKNOWLEDGMENTS

We wish to thank the following friends for the loan of specimens used in this study: Charles Glass and Robert Foster of Santa Barbara, California, Carole and Jules Hertz of San Diego, California and June King of San Diego, California. We extend our appreciation to Jules Hertz for kindly reading the paper and for his helpful suggestions and to William K. Emerson and Walter Sage for their critical review. We are grateful to Theo Fusby for typing the manuscript.

LITERATURE CITED

BAKER, F.C.
1890. On the modification of the apex in *Murex*. Proc. Acad. Nat. Sci. Phila. 42:66-72.
BANDEL, K.
1974. Studies on Littorinidae from the Atlantic. Veliger 17(2):92-114, 59 figs.
BOUCHET, P.
1976. Mise en evidence de stades larvaires planctoniques chez des Gasteropodes Prosobranches des etages bathyal et abyssal. Bull. Mus. Nat. Hist. Nat. Zoologie 277:947-971, 8 pls.
_________ & A. WAREN
1979. Planktotrophic larval development in deep-water gastropods. Sarsia 64(1-2):37-40, 12 figs.
1980. Revision of the northeast Atlantic bathyal and abyssal Turridae (Mollusca, Gastropoda). Jour. Moll. Studies, Supp. 8:1-119, 281 figs.
DALL, W.H.
1890. Contributions to the Tertiary fauna of Florida. Wagner Free Inst.3(1): 199 pp., 12 pls.
1924. On the value of nuclear characters in the classification of marine gastropods. Jour. Wash. Acad. Sci. 14(8):177-180.
D'ATTILIO, A.
1972. Remarks on Coralliophilidae (Gastropoda, Muricacea). Festivus 3(8): 2-5, fig. 16.
1980. A supplementary note on *Favartia dorothyae* Emerson and D'Attilio, 1979. Festivus 12(5):67-68, 5 figs.

D'ATTILIO, A.

1983a. Microscopic examination of the surface sculpture, protoconch, and operculum of *Homalocantha oxyacantha* (Broderip, 1883). Festivus 15(9): 92-93, fig. 5.

1983b. *Homalocantha secunda* notes on distribution, shell morphology, and radula. Festivus 15(5):48-50, 6 figs.

__________ and B.W. MYERS

1983a. Observations on *Pteropurpura bequaerti* (Clench and Perez Farfante, 1945). Festivus 15(3):33-38, 9 figs.

1983b. The genus *Pteropurpura* Jousseaume, 1880 (Muricidae: Ocenebrinae). Festivus 15(11):111-112, 3 figs.

1984. Description of five new muricacean gastropods and comments on two additional species in the families Muricidae and Coralliophilidae: (Mollusca). Trans. S.D. Soc. Nat. Hist. 20(5):81-94, 34 figs.

1985a. Two new species of *Favartia* from the west Pacific Ocean (Gastropoda: Muricidae). Nautilus 99(2-3):58-61, 11 figs.

1985b. Redescription of *Murex interserratus* G.B. Sowerby II, 1879. Festivus 17(2):17-21, 7 figs.

1985c. A new species of *Pygmaepterys* Vokes from the western Pacific (Gastropoda: Muricidae). Nautilus 99(1):9-13, 15 figs.

FINLAY, H.J.

1931. On *Austrosassia*, *Austroharpa* and *Austrolithes*, new genera with some remarks on the gastropod protoconch. Proc. Roy. Soc. N.A. 62:7-19.

FRETTER, V. AND M.C. PILKINGTON

1971. The larval shell of some prosobranch gastropods. Jour. Mar. Biol. Assn. U.K. 51:49-62, 2 pls., 3 text figs.

GRABAU, A.W.

1902. Studies of Gastropoda I. Amer. Nat. 36:917-945, 18 figs.

1904. Phylogeny of *Fusus* and its allies. Smithsonian Misc. Coll. 44:1-157, 18 pls.

1907. Studies of Gastropoda III on orthogenetic variation in Gastropoda. Amer. Nat. 41:607-646, 3 pls.

1912. Studies of Gastropoda IV., Value of the protoconch and early conch stages in the classification of Gastropoda VII. Proc. Internat. Zool. Congr.

HARRIS, G.F.

1897. Catalogue of Tertiary Mollusca in the Dept. of Geology, British Museum (Nat. Hist.), Pt. I. The Australasian Tertiary Mollusca.

JABLONSKI, D, AND R.A. LUTZ.

1979. Lethaea Seminar 12:306, 1 fig.

1980. Molluscan larval shell morphology ecological and paleontological applications 323-377, 15 figs. in D.C. Rhoads and R.A. Lutz, SKELETAL GROWTH OF AQUATIC ORGANISMS. Plenum Press, NY 750 pp.

KESTEVAN, H.L.

1905. Notes on Prosobranchiata No. IV. The ontogenetic stages represented by the gastropod protoconch. Proc. Linn. Soc. N.S.W.30.

1912. The constitution of the gastropod protoconch; its value as a taxonomic feature and the significance of some of its forms. Proc. Linn. Soc. N.S.W. 37.

MYERS, B.W. AND A. D'ATTILIO

1981. The morphology and distribution of *Ocenebra grippi* (Muricidae: Ocenebrinae). Nautilus 95(3):124-127, 5 figs.

POWELL, A.W.B.

1966. The molluscan families Speightiidae and Turridae. Bull. Auckland Inst. and Mus.5, 184 pp., 23 pls.

RADWIN, G.E. AND J.L. CHAMBERLIN
1973. Patterns of larval development in stenoglossan gastropods. Trans. S.D. Soc. Nat. Hist. 17:107-117.

RADWIN, G.E. AND A. D'ATTILIO
1976. MUREX SHELLS OF THE WORLD, Stanford Univ. Press. Stanford, CA, 284 pp., 32 pls., 192 text figs.

ROBERTSON, R.
1976. Marine prosobranch gastropods: Larval studies and systematics. Thalassia Jugoslavica 10(½):213-238.

SCHELTEMA, R.S. AND I.P. WILLIAMS
1983. Long distance dispersal of planktonic larvae and the biogeography and evolution of some Polynesian and western Pacific mollusks. Bull. Mar. Sci. 33(3):545-565.

SHUTO, T.
1974. Larval ecology of prosobranch gastropods and its bearing on biogeography and paleontology. Lethaia 7:239-256, 3 figs.
1983. Larval development and geographical distribution of the Indo-West Pacific *Murex*. Bull. Mar. Sci. 33(3):536-544.

SMITH, B.
1945. Observations on gastropod protoconchs. Paleontographica Americana 3(19):225-268.
1946. Observations on gastropod protoconchs. *ibid* 3(21):289-300, pl. 1.

THIRIOT QUIEVREUX, C.
1972. Microstructures de coquilles larvaires de prosobranches au microscope electronique a balayage. Arch. Zool. Exp. Gen. 113:553-564.
1980. Identification of some planktonic prosobranch larvae present off Beaufort, North Carolina. Veliger23(1):1-9, 57 figs.

THORSON, G.
1950. Reproductive and larval ecology of marine bottom invertebrates. Biol. Rev. (Camb.) 25:1-45.

THE GOOD OLD CLAMMING DAYS

This photograph taken by Richard Cerutti in 1974 at Imperial Beach, California shows his daughter Monica, with three live pismo clams [*Tivela stultorum* (Mawe, 1823)]. The specimen in her hand, now in the San Diego Natural History Museum collection (SDNHM 87763) is 157± mm long with an altitude of 125± mm.

The only specimen in the Museum collection larger than this one (SDNHM 15078) is 165± mm long and has an altitude of 125± mm It was collected on 1 January 1928 at Morro Beach, San Luis Obispo, Co., California by C.L. Cass and was part of the Joshua Baily collection.

Have you seen one this size lately?

CLUB NEWS

THE ANNUAL AUCTION/POTLUCK

It was one of the best parties the Club has ever had! Close to sixty people, members and guests, attended the Auction at the McPeak's lovely and spacious home. There was "Dave's Punch" served on the patio, a generous and delicious array of food delights for the potluck dinner coordinated by June King and the fun of being with friends old and new.

The shells and related art work donated for the Auction were exceptional. An original drawing of *Murex japonica,* an underwater photograph of *Calliostoma annulatum* and specimens of *Conus gloriamarius, Oliva foxi, Angaria sphaerula,* and *Strombus goliath* were among the many specimen quality shells donated by Club members.

At 8:00 P.M., Richard Herrmann announced the start of the auction. The auctioneers Carole Hertz, Dave Mulliner, and Marty Schuler were introduced, our members were applauded for their generosity in their donations and the auction began. It was great fun. The bidding was lively and good natured and the results a financial success.

Our gratitude to our hosts Mary and Ron McPeak for opening their home to us and making us feel welcome and "at home."

CLUB SCIENCE FAIR WINNER CHOSEN

Joshua Keller, a ninth grader at La Jolla High School was the Club's winner in the 1986 Greater San Diego Science and Engineering Fair. Joshua will present his project, "The Effect of Acid Rain on Bivalve Mollusks" to the membership at the June meeting at which time he will receive his Club award.

PLANT SALE REMINDER

The Annual Plant Sale of the San Diego Botanical Garden Foundation is the 24 - 25 May 1986. The Club's plant donations are needed and may be brought to the library (Rm. 104) on May 23. If you can not deliver your donation yourself, contact Carole Hertz to arrange for delivery (277-6259).

THE FESTIVUS
A publication of the San Diego Shell Club

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Meeting date: third Thursday, 7:30 P.M. Room 104, Casa Del Prado, Balboa Park

The Festivus is published monthly except December. The publication date appears on the masthead above.

PROGRAM

Ancient Egypt and the Exotic Underwater World of the Red Sea

Dave Mulliner and Bob Yin, recently returned from the Red Sea, will present this program with their slides and a shell display.

Meeting date: 19 June

CONTENTS

OTALA LACTEA (MÜLLER, 1774) LAYING EGGS

BY

RICHARD CERUTTI

Department of Paleontology, San Diego Natural History Museum, Balboa Park,
P.O. Box 1390, San Diego, California 92112

I first observed *Otala lactea* laying eggs shortly after a rain on December 5, 1985 at the 61st Street and Woodman locale [see map in Festivus 17(11):120]. I observed two clutches of eggs, one with 55 eggs and the other with 71. Figures 1 and 2 are photographs of the *Otala* nest and the eggs within the nest and Figure 3 is a drawing in cross section of *Otala lactea* laying eggs.

Fig. 1. Nest of *Otala lactea*

Fig. 2. Eggs in the nest

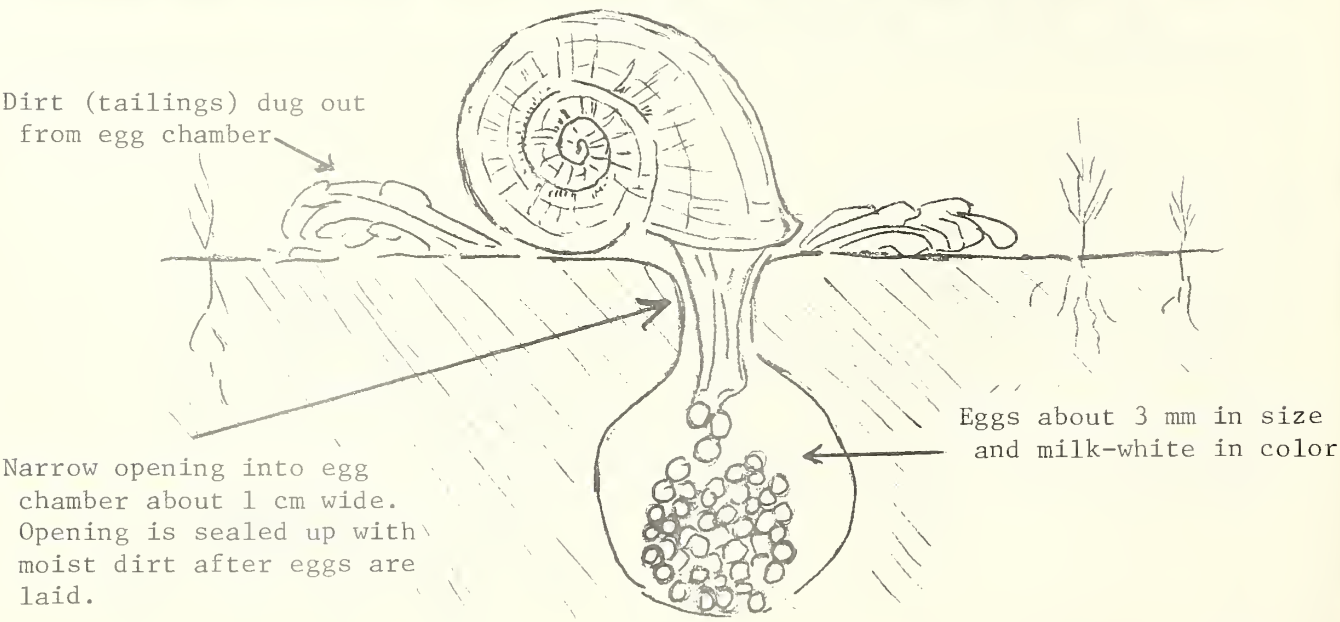

Fig. 3. Cross section of *Otala lactea* laying eggs into hollow dug out egg chamber about 2X2 cm wide and about 4 cm total depth from surface.

Editor's note: The photographs of *Otala lactea* were taken by David K. Mulliner in his studio. During the time he spent striving to get the best possible photographs, some of the eggs hatched and Dave then took the pictures of the young juveniles shown in Figures 4 and 5. All the eggs and hatched juveniles were then placed in alcohol.

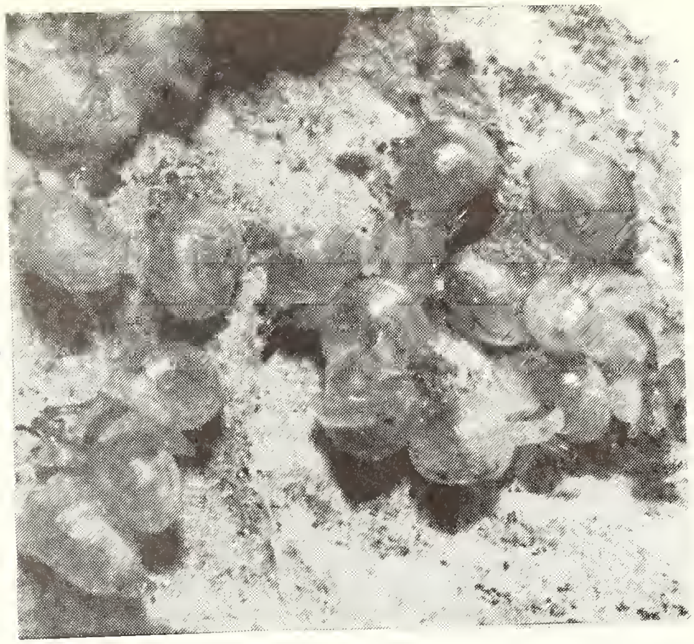

Fig. 4. Newly-hatched juveniles of *O. lactea*

Fig. 5. Two newly-hatched juvenile *O. lactea* on a blade of grass

A TROPICAL NIGHT ADVENTURE AT PESCADOR ISLAND

BY

DAVID K. MULLINER and LINDA SJOLIE

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San Diego, California 92109

2527 San Diego Avenue,
San Diego, California 92110

In January 1986 we were at Sumisid Lodge in Moalboal located on the tropical southwestern shore of Cebu Island in the Philippines (Figure 1). From the patio, the sandy beach ends in a coral shelf that extends about 100 feet under the clear water to a deep drop-off. Three miles from shore, out in the Tanon Strait, rises a small volcanic island called Pescador. Its great underwater beauty and faunal diversity is much beloved by divers and underwater photographers.

The banca, a twin pontoon canoe, is used all over the Philippines as a fishing boat, transportation among the over 7000 islands, and for diving. Our banca (Figure 2) left the resort at dusk headed for Pescador Island. Six of us were aboard: Linda Sjolie, Ralph Richie, Bob Yin, Dave Mulliner, the boatman and the Sumisid Lodge Divemaster, Mario. As the evening light faded into darkness we crossed to the island through relatively smooth seas.

The water was a warm 80°F so we only wore lightweight wetsuits to protect us from the sharp coral and slight chill of an hour-long dive. Rolling off the boat we drifted slowly down through the transparent water to the shallow coral rubble and sand bottom. Linda began finding shells immediately. Trochids were clinging to the underside of large eroded coral heads, cones in the niches of bottom coral, and strombus along the flat shelf. Hermit crabs inhabited shells everywhere; one was in a large tun shell covered with symbiotic anemones.

The challenging hobby of underwater photography occupied our thoughts as we descended slowly into

Figure 1. Sumisid Lodge on Cebu Island

Figure 2. The banca being readied for the dive.

the deep. Soft corals extend out of the cliff face; table corals and staghorn grow from narrow ledges. The beauty of these colorful coral gardens is enhanced by crinoids on top of huge vase sponges extending their feeding, feathery arms upward to capture the abundant plankton (Figure 3). The strobe lights of our cameras flashed as we recorded these images on film. The photo subjects were everywhere; a small cleaner shrimp in a cave, a pretty green eel sliding out of its lair and fish sleeping among the corals. We saw zig-zag oysters hanging from gorgonians and tridacnas "open-mouthed" imbedded in the brain coral.

Swimming north along the drop-off at a depth of 60 feet we found ourselves drifting in a mild current. Ralph found a *Spurilla* nudibranch and then another. These beautiful orange aeolids were prime photo subjects and one was collected for further study. As we reached the half-way point in our dive, we ascended to 50 feet and pulled ourselves slowly along the cliff face, shining underwater lights over the brilliantly colored corals, sponges, tunicates, feather worms and anemones. Ctenophores floated by over-head and bright flashes of light erupted as we moved our arms through the water and disturbed the dinoflagellates.

Figure 3. Sea cucumbers on a vase sponge similar to those on which crinoids were found.

The light from the boat reflected through the water as we made our way into the shallows. Once again we began finding sea shells. Linda gingerly brought a large poisonous *Conus geographus* over to be put in the collecting container. She was holding it by the apex and at arms length. We also found a *Bursa* and several *Cancellaria*. An eel was writhing along the edge in a small depression and a puffer fish curiously investigated while we shot their picture (Figure 4). Then out of the inky-darkness a night feeding trumpet fish appeared. Bob, ready with camera, slipped silently closer to obtain a perfect picture. A bright orange

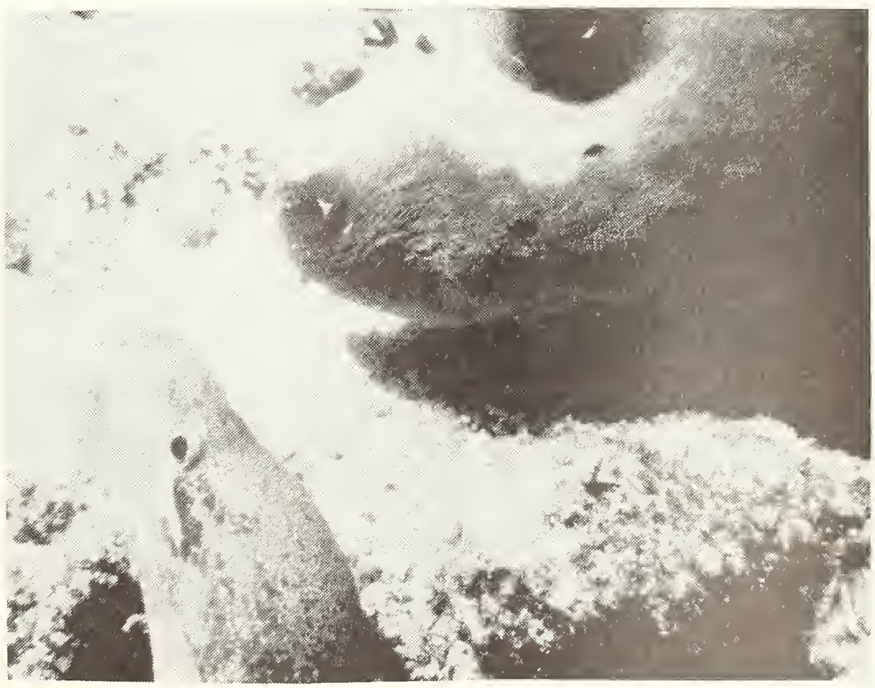

Figure 4. A curious puffer fish investigating an eel

colored lion-fish on a ledge bristled its spines and spread its venomous pectoral fins reminding us that we must come back to photograph more of this fantastic underwater world.

Out of film and low on air we swam towards the boat. Suddenly a ball of catfish (there must have been about thirty), seemingly bouncing along the bottom, materialized in our light. As the boat headed homeward we shared our experiences, showed our collected shells, and watched the phosphorescence along our wake.

SPECIES COLLECTED AT PESCADOR ISLAND, P.I., JANUARY 1986*

Astraea rhodostoma (Lamarck, 1822)
Bursa lampas Linne, 1758
Cerithium echinatum (Lamarck, 1822)
Chicoreus palmarosae Lamarck, 1822
Chicoreus torrefactus (Sowerby, 1841)
Conus aulicus Linne, 1758
Conus geographus Linne, 1758
Conus striatus Linne, 1758
Conus virgo Linne, 1758
Cypraea punctata Linne, 1771
Cypraea vitellus Linne, 1758
Hipponix conicus (Schumacher, 1817)
Lambis millepeda (Linne, 1758)
Latirus gibbulus (Gmelin, 1791)
Strombus luhuanus Linne, 1758
Thais echinulata Lamarck, 1822
Trochus maculatus Lamarck, 1758
Turbo chrysostomus Linne, 1758
Xenoturris cingulifera (Lamarck, 1822)

Literature consulted

Cernohorsky, Walter O. 1972. MARINE SHELLS OF THE PACIFIC, Vol. II, Pacific Publications, Sydney. 411 pp., 68 pls.

Dance, S. Peter, ed. 1974. THE COLLECTORS ENCYCLOPEDIA OF SHELLS. McGraw-Hill, Toronto. 288 pp.

Eisenberg, Jerome M., 1981. A COLLECTORS GUIDE TO SEASHELLS OF THE WORLD. McGraw-Hill. 239 pp.

* The list above was compiled by Margaret Mulliner and Linda Sjolie.

IN MEMORIAM

CHRIS PERRIN
1962 - 1986

BOOK NEWS

IT'S EASY TO SAY CREPIDULA! (kreh PID' yu luh)
A Phonetic Guide to Pronunciation of the Scientific Names of Sea Shells and a Glossary of Terms Frequently Used in Malacology
By Jean M. Cate and Selma Raskin 1986
Pretty Penny Press, Santa Monica, CA, 155 pages, softbound
Price: $19.95 plus postage and 6% tax for California residents

This new phonetic guide to pronunciation of the scientific names of sea shells is fun. The preface and section on conventions and abbreviations are written with a light touch, encouraging the reader to look a bit further. The pages are also generously spaced perhaps to avoid the ponderous appearance of a dictionary.

The pronunciation guide itself (following a page listing commonly used Latin abbreviations and their meanings) is set up alphabetically by genus with family names below, following which a selection of species names (with authors) is arranged in alphabetical order. The pronunciation for each of these scientific names is given in easy-to-follow phonetic spelling often with more than one choice listed. Where the species name is patronymic, the name of the honored person or place is given— sometimes with an explanatory phrase. This reluctant Latin scholar would have enjoyed supplementary notes for a few of the other species names as well.

This is not a "complete" guide. The authors "have purposely omitted listing many shell species that seem easy enough to pronounce without a phonetic guide, and have included only the more difficult." They have also excluded some genera and families listing only "the most popularly collected families and species." Because the guide is arranged alphabetically by genus, a species name common to several genera may be difficult to find. For example, in the guide the species name *aspera* (AS' per uh) appears under *Littorina*. In Keen's (1971) SEA SHELLS OF TROPICAL WEST AMERICA, *aspera* is a species name in genera of eight different families. In such cases the reader may not readily find the species name for which he is searching.

Following the pronunciation section is an index of popular names, a fine glossary of frequently used malacological terms, a reference section and general index. For those who are intimidated by scientific terminology, this book will be a reassuring companion; and for those who enjoy words just for the sounds of them, reading through this guide will be a pleasant exercise.

Carole M. Hertz

TWO ANNOUNCEMENTS OF NEW BOOKS RECEIVED

Notice has been received from Carlos Leobrara that the book SHELLS OF THE PHILIPPINES by F.J. Springsteen and F.M. Leobrera will soon be available from Carfel Seashell Museum (1786 A. Mabini St., Malate, Manila, Philippines). It will include marine, fresh water, and terrestrial mollusks treating over 1600 species with 100 full color plates.

SEASHELL TREASURES OF THE CARIBBEAN by Lesley Sutty is now available. It is announced that over 100 rare species are described and illustrated on 138 full color plates by Miss Sutty. For this first printing a special bookplate edition numbered and autographed is available for $21.95 (postpaid) from American Malacologists, Box 1192, Burlington, MA 01803.

COMMENTS FROM OUR READERS*

From Twila Bratcher on the article on H.N. Lowe [Festivus 18(3):26-43, March 1986]

"You might be amused at how much he [H.N. Lowe] must have loved his shell collection. When he and Pilsbry described *Terebra brunneocincta* they had only two specimens of that species, the holotype and a single paratype. I had examined the paratype in the San Diego museum, a beautiful specimen, which I assume was part of his own collection. Later when I was photographing the holotype in the Philadelphia Academy of Sciences I was amazed to find it was a poor specimen with the posterior third missing entirely. Evidently Lowe could not stand to part with his perfect specimen, so he made the broken one the holotype."

From R. Tucker Abbott on "The Good Old Clamming Days" [Festivus 18(5):78, May 1986]

"...your readers might be interested to know that many articles have been published on this great edible clam [*Tivela stultorum*, the Pismo clam]. The best account is by the late John E. Fitch in the 1951 California Fish and Game Commission Bulletin in which he records a record length of 187 mm (7 3/8 inches). Six inches is the usual length of large specimens, many of which in 1893 sold in the Los Angeles Fish Market for five cents each. W.R. Coe (1947) and F.W. Weymouth (1919 and 1923) worked out the age of these clams on the basis of the external growth rings. Miss Monica Cerutti's clams, illustrated in The Festivus article, look to be about 6 or 7 years old. Fitch claimed a 35-year old life span for specimens from Baja California. R.E.C. Stearns, in 1898, published a fascinating illustrated account of the color variations and gave 16 new technical *forma* names (Proc. U.S. National Museum, vol. 21, pp. 371-378). Many interesting accounts of this wonderful clam appear in the early issues of The Nautilus from 1886 to about 1910."

* Excerpts from correspondence are published with the permission of the writers.

Editor's Note: Concerning the paper by Anthony D'Attilio on the rediscovery of *Murex norrisii* Reeve, 1845 [Festivus 18(4):48-50] — The specimen from Ecuador figured in this paper has been donated to the San Diego Natural History Museum (SDNHM 90734) by Mrs. Carol Skoglund as had been her original intention.

CLUB NEWS

FROM THE MINUTES - SAN DIEGO SHELL CLUB MEETING - 15 MAY 1986

Vice President Wes Farmer called the meeting to order and introduced Jeff Hamann, our speaker for the evening, who presented a show of stunning slides of nudibranchs he had photographed during his diving trips throughout many parts of the world.

A short business meeting followed the refreshment break, the cookies kindly provided by Nola Michel and Margaret Mulliner. The date for the Fall party - with a Baja theme - will be Saturday, September 25th and will be held at the home of Barbara and Wes Farmer. Treasurer Nola Michel reported that the 1986 Auction was the most successful yet and everyone was applauded for their generosity. The shell drawing was won by Nola Michel.

FOR YOUR INFORMATION

The WSM/AMU combined annual meeting will be held from July 1-5 at the Monterey Sheraton Hotel. Three symposia are planned 1) biology of opisthobranch mollusks

2) life history, zoogeography, and systematics of the Cephalopoda, and 3) molluscan morphology in addition to contributed papers, workshops, and field trips - one of which will be a special visit to the new Monterey Aquarium. There is still a chance to make arrangements to attend this meeting. For further information contact Margaret Mulliner, WSM treasurer, 5283 Vickie Dr., San Diego, CA 92109.

The Conchologists of America Annual Convention will be held at the Sheraton Yankee Trader Hotel at Fort Lauderdale, Florida from July 15-19. Approximately fifteen programs by collectors and authorities are planned as well as field trips, auction, and two dealers' bourses. For further information contact Ruth Chesler, Convention Chairman at 7401 S.W. 7th St., Plantation, FL 33317.

The 7th Midwest Regional Shell Show, hosted by the Indianapolis Shell Club, will be held at the Glendale Mall in Indianapolis from August 8-10. Deadline for exhibit applications is July 19. For further enformation contact Marion R. Magee. 2117 Fisher Ave., Speedway, IN 46224.

The Jacksonville Shell Club will hold its 22nd Shell Show at the Jacksonville Beach Flag Pavilion from August 1-3. Application blanks for exhibitors will be available at our June meeting. For further information contact Norma J. Bulock, Chairman 10960 Beach Blvd., #413, Jacksonville, FL 32216.

NEW MEMBERS

Durand-Portal, Bernard, 3 Impasse Pointe Gallopin, 91360 Epinay-sur-orge, France
Haigh, Betty and Ernest, P.O. Box 3599, Simi Valley, CA 93063. (805) 581-2761
Stephens, Susan B., P.O. Box 217, Sanibel, FL 33957

TOO LATE FOR THE ROSTER

Montoya, Michel, P.O. Box 4830, Managua, Nicaragua, Central America

INADVERTENTLY OMITTED FROM THE ROSTER

Kabat, Alan, Museum of Comparative Zoology, Harvard Univ., Cambridge, MA 02138

THE FESTIVUS
A publication of the San Diego Shell Club

ISSN: 0738-9388

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Annual dues are payable to San Diego Shell Club. Single member: $10.00; Family membership: $12.00 Overseas (surface mail): $12.00 Address all correspondence to the San Diego Shell Club, Inc., c/o 3883 Mt. Blackburn Ave., San Diego, CA 92111 Single copies of this issue: $5.00. Postage is additional.

Meeting date: third Thursday, 7:30 P.M. Room 104, Casa Del Prado, Balboa Park

The Festivus is published monthly except December. The publication date appears on the masthead above.

PROGRAM

Michael Lang, of San Diego State University, will present a slide program entitled, "Life Histories of Cephalopods." Mr. Lang, who spent six weeks this spring studying benthic sea life in the Antarctic, is a marine collector in the biology department and is completing his Masters Degree.

Joshua Keller, the Club Science Fair Winner for 1986, will present his winning project, "The effects of Acid Rain on Bivalve Mollusks," and receive his Club award.

Meeting date: 17 July

CONTENTS

ILLUSTRATIONS AND COMMENTS ON MUREX PAGODUS A. ADAMS, 1853

BY

ANTHONY D'ATTILIO

Department of Marine Invertebrates, San Diego Natural History Museum, Balboa Park, P.O. Box 1390, San Diego, California 92112

In 1983 I wrote to the British Museum (N.H.) to obtain a photograph of *Murex pagodus* A. Adams, 1853, to determine its identity relative to a number of species of *Latiaxis*. Study of the photographs received and reproduced here in Figures 1 and 2 from D'Attilio (1983: 2, figs. 1 and 2) left no doubt that *Murex pagodus* A. Adams was not equal to the figure of *Latiaxis pagodus* A. Adams in Kira (1955, fig. 13) and Kira (1962, English ed., pl. 26, fig. 13). In D'Attilio (1983), I also attempted to compare several other coralliophilid species to the type of *M. pagodus*.

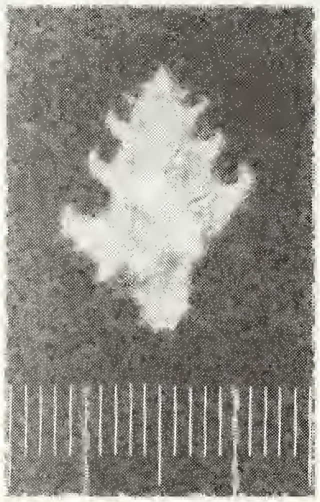

Fig. 1. Dorsal view of holotype of *Murex pagodus* A. Adams, 1853 BMNH Reg. No. 1982294

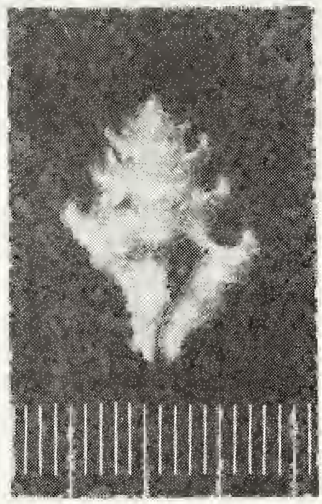

Fig. 2. Apertural view of holotype of *M. pagodus* From D'Attilio (1983)

At that time I was not aware that as early as 1952, Kuroda and Habe had placed *Latiaxis spinosus* Hirase, 1908, in the synonymy of *Murex pagodus* A. Adams. However, the figure of *M. pagodus* of authors (in Kira 1955) does not appear to be the same as that of *L. spinosus* Hirase, 1908, when compared with the figures of *L. spinosus* in the description by Hirase. I have been unable to discover if the type of *Latiaxis spinosus* is extant, but I believe that the Hirase collection was destroyed during World War II.

Subsequent to my paper in The Festivus (1983), Mr. Robert Foster called my attention to his observations that *Murex pagodus* seemed to be identical with somewhat immature specimens of *Attiliosa nodulifera* (Sowerby, 1841). Before I could further investigate this problem, Dr. Sadao Kosuge and Mr. Masaji Suzuki had reached the same conclusion as Mr. Foster, and this was published in ILLUSTRATED CATALOGUE OF LATIAXIS AND ITS RELATED GROUPS, FAMILY CORALLIOPHILIDAE in 1985. The type of *Murex pagodus* figured in plate 35, figure 3, of that volume correctly refers the species to *Attiliosa nodulifera* without further comment.

For this review the single typological specimen of *Murex pagodus* was borrowed from the British Museum (Natural History) and specimens of *Attiliosa nodulifera*, collected at various localities in the southern and western Pacific, were placed at my disposal by Mr. Charles Glass and Mr. Robert Foster of Santa Barbara.

The type of *Murex pagodus* (Figures 3 and 4) is immature, apparently collected in a dead state, polished white, with the outer lip immature or broken. It lacks, thus, the dentate outer lip characteristic of both immature as well as mature *Attiliosa nodulifera*. The type of *M. pagodus* is 18 mm in height x 13.5 mm in width, lacking a protoconch but with a teleoconch of six whorls. The six varices

Fig. 3. *Murex pagodus* A. Adams, 1853
Dorsal view of holotype
BMNH Reg. No. 1982294

Fig. 4. Apertural view of holotype of *Murex pagodus*
Size: 18 mm H x 13.5 mm W

ending terminally in ramose spines (three on the body whorl) are well defined in the broadly fusiform shell. The shoulder is rounded and the intervarical areas are weakly depressed. No knowledge of the habitat of this specimen, which was in the collection of Hugh Cuming, was given by A. Adams.

A specimen of nearly equal size of *Attiliosa nodulifera* (20 mm in height) (Figures 5 and 6) is illustrated herein for comparison with the type of *M. pagodus*. It is an immature specimen also. The aperture retains five dentate-like nodes within the outer lip margin as shown in Figure 6. Figure 7 is a detail of the laminately folded shoulder spines on the apertural side of *A. nodulifera*.

Murex noduliferus Sowerby, 1841 is very well illustrated in CONCHOLOGICAL ILLUSTRATIONS (pl. 194, fig. 94) and is reproduced here in Figure 8. It usually reaches a height of 30 mm and has an aperture frequently colored some shade of apricot, though it may be entirely white. The species was transferred to *Attiliosa* by Vokes and D'Attilio (1982), with a number of illustrations provided. Two views of one specimen are reproduced here in Figures 9 and 10.

As a result of the lack of illustrations in the literature until recent years, *Murex pagodus* remained a doubtful species. It was cited in Kuroda and Habe (1952), Vokes (1971) and D'Attilio (1983) as *Latiaxis* and then correctly as *Attiliosa nodulifera* (with *Murex pagodus* a junior synonym) in Kosuge and Suzuki (1985). *Murex noduliferus* has been shifted around generically to *Muricopsis* and *Marchia* and lastly to *Attiliosa*, its Muricinae radula comparable to other species of *Attiliosa*.

ACKNOWLEDGMENTS

I acknowledge with thanks the Trustees of the British Museum (N.H.) and Ms. Kathie Way of that institution, and Charles Glass and Robert Foster of Santa Barbara for their loan of specimens studied. Barbara W. Myers, my colleague, afforded me some helpful remarks and technical assistance and Theo Fusby typed the manuscript.

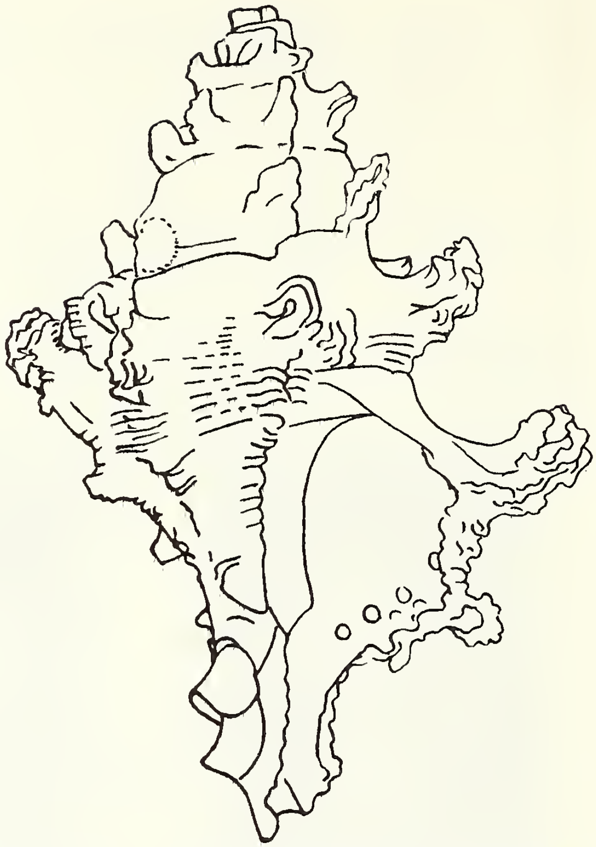

Fig. 5. *Attiliosa nodulifera* (Sowerby, 1841) Dorsal view. Size: 20 mm height

Fig. 6. Apertural view of specimen shown in Figure 5.

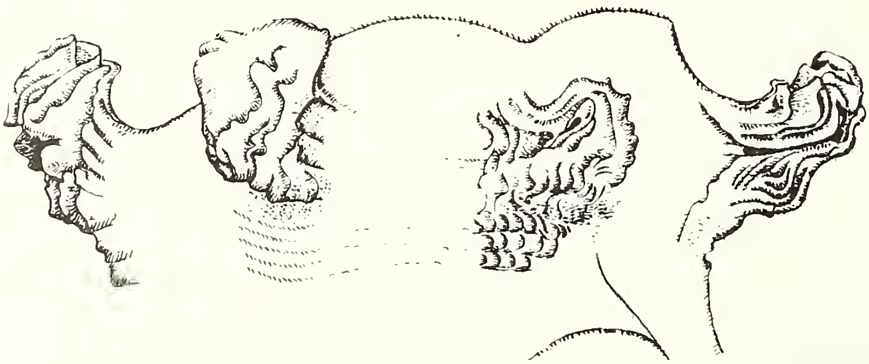

Fig. 7. Detail of laminately folded shoulder spines on the apertural side of specimen of *A. nodulifera* shown in Figure 6.

Fig. 8. *Murex noduliferus* Sowerby, 1841 from CONCH. ILLUS. pl. 194, fig. 94

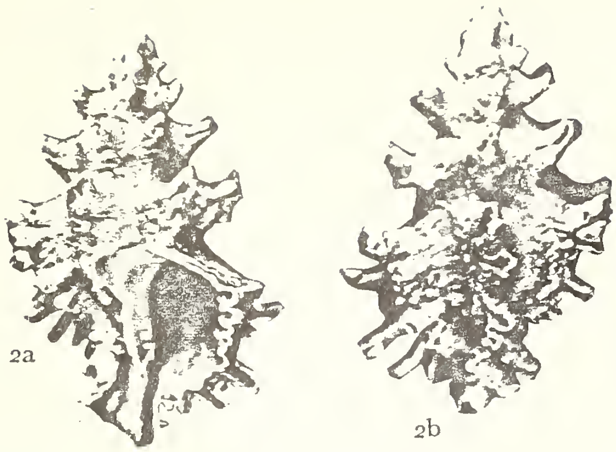

Fig. 9. Two views of a specimen of *Attiliosa nodulifera* reproduced from Vokes and D'Attilio (1982)

LITERATURE CITED

ADAMS, A.
1853. Descriptions of several new species of *Murex, Rissoina, Planaxis* and *Eulima* from the Cumingian collection. Proc. Zool. Soc. London (1851): 267-272.

D'ATTILIO, A.
1983. Concerning the identity of *Murex pagodus* A. Adams, 1853. The Festivus Vol. 15(1):2-4, 9 figs.

HIRASE, Y.
1908. Appendix on Japanese Marine Mollusca (11) with the descriptions of new species of Muricidae and Buccinidae. The Conch. Mag. 2(12):69-73, pls. 42 and 43.

KIRA, T.
1955. COLOURED ILLUSTRATIONS OF THE SHELLS OF JAPAN. Hoikusha, Japan, 204 pp. 67 pls.
1962. [Enlarged and revised ed. in English] SHELLS OF THE WESTERN PACIFIC IN COLOR. Hoikusha, Japan. 224 pp., 72 pls.

KOSUGE, S. and M. SUZUKI
1985. ILLUSTRATED CATALOGUE OF LATIAXIS AND ITS RELATED GROUPS FAMILY CORALLIOPHILIDAE. Spec. Pub. No. 1, Inst. Malac. Tokyo. 83 pp., 50 pls.

KURODA, T. and T. HABE
1952. CHECK LIST AND BIBLIOGRAPHY OF THE RECENT MARINE MOLLUSCA OF JAPAN. Stach, Tokyo. 210 pp..

SOWERBY, G.B. (2nd of name).
1841. CONCHOLOGICAL ILLUSTRATIONS. *Murex*. London. pls. 187-199.

VOKES, E.H.
1971. Catalogue of the genus *Murex* Linne (Mollusca: Gastropoda); Muricinae, Ocenebrinae. Bull. Amer. Paleo. 61(268):1-141.

__________ and A. D'ATTILIO
1982. Review of the muricid genus *Attiliosa* (Mollusca: Gastropoda). Veliger 25(1):67-71, 10 figs.

A VARIABLE ANACHIS (COLUMBELLIDAE) FROM ECUADOR

BY

CAROL SKOGLUND

3846 E. Highland Avenue, Phoenix, Arizona 85018

Columbella parva Sowerby, 1844 (p. 142, pl. XL, fig. 170), was described as follows: "Shell oblong, pale, with a single spiral chestnut coloured band; apex acuminated, volutions 6, longitudinally ribbed, cross-striated, the last smooth anteriorly near the outer variciform lip; aperture rather short, somewhat sinuous; columellar lip raised. Found under stones at Monte Christi, West Columbia, H. Cuming." Since the name *C. parva* was preoccupied, it was replaced by *C. milium* Dall (1916). In 1971 Keen noted that of four specimens in Sowerby's type lot, only one shell matched his description. She also corrected his location to Monti Cristi (Manta), Ecuador.

In 1928, Bartsch described two new species of *Anachis* from Ecuador, *A. reedi* and *A. strongi*. *Anachis reedi* (Figure 1) is a flesh colored shell with a narrow zone of brown above the suture and a broad, much darker band on the base. It has four heavy denticles on the outer lip. Three specimens in Sowerby's type lot of *C. parva* are this species (Keen 1971). *Anachis strongi* (Figure 2) is described as a dark chestnut brown shell with an even darker band on the base. The seven denticles on the outer lip include two heavy ones.

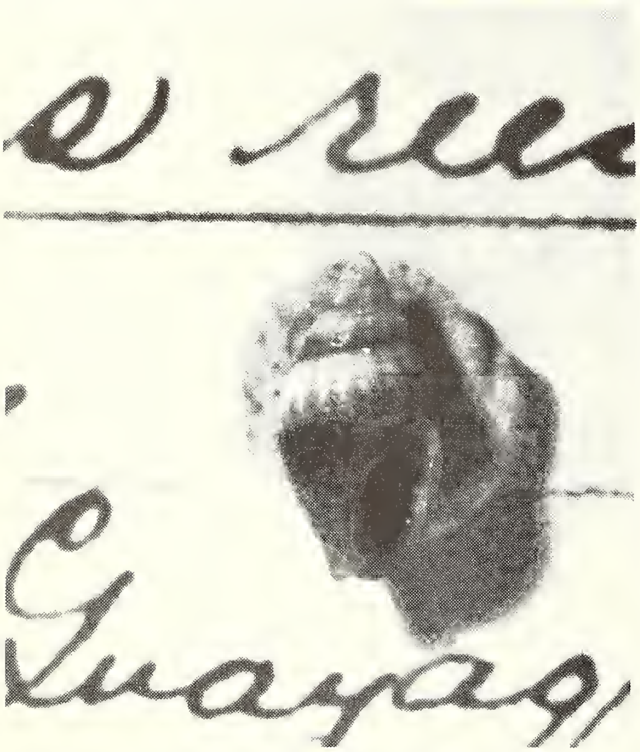

Fig. 1. *Anachis reedi* Bartsch, 1928
USNM 367979, holotype
Length: 5.3 mm (per Bartsch 1928)

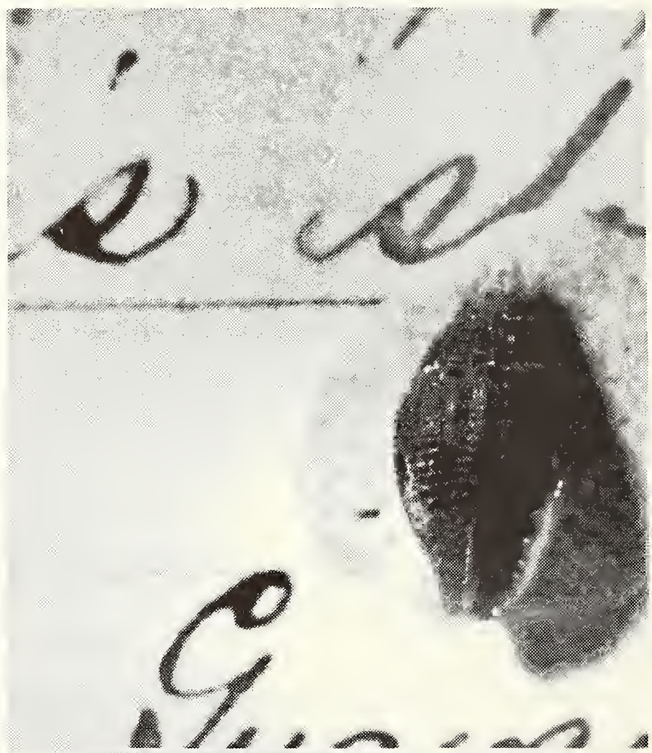

Fig. 2. *Anachis strongi* Bartsch, 1928
USNM 367978, holotype
Length: 6.0 mm (per Bartsch 1928)

In February 1980, I collected at several localities in Ecuador, from Camerones in the north to Playas de Villamil in the south. At each location where there were very large boulders or bedrock near the upper midtide level, small encrusted *Anachis*

were found in pits in the rocks.

Characteristics of all three of the above species are present in the shells in any given population. The shells range from a smooth, ribless form to a chunky, heavily ribbed form. Colors vary from a solid dark brown to flesh colored shells with various banding patterns. The spiral ribbing varies from shell to shell, as do the denticles on the outer lip. Figure 3 shows the variability in a population from Salinas, Guayas, Ecuador and in Figures 4 and 5, the top center specimen shown in Figure 3 is greatly enlarged.

I conclude that a single highly variable species is involved and that the earliest name, *Anachis milium* (Dall, 1916) should be used.

I would like to thank David K. Mulliner for photographing the specimens in Figures 3 to 5 and the San Diego Natural History Museum for permission to use the photographs of the two holotypes.

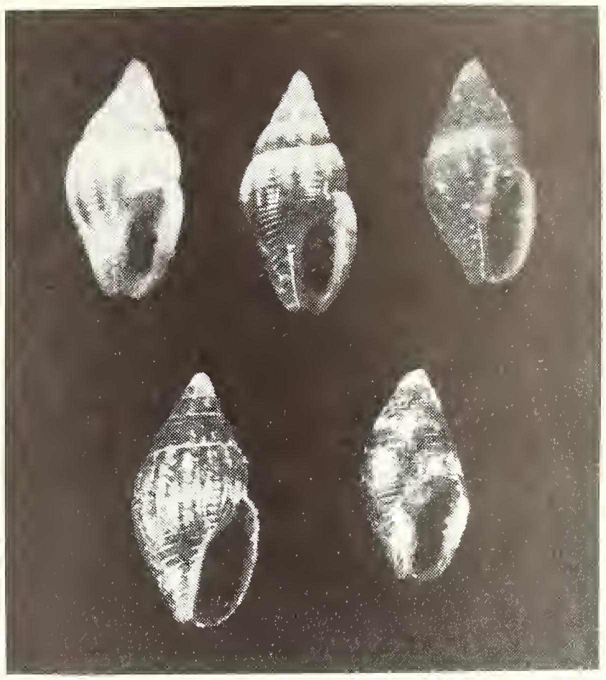

Fig. 3. *Anachis milium* (Dall, 1916), five specimens from Salinas, Guayas, Ecuador collected in pits in boulders at upper midtide level, February 1980

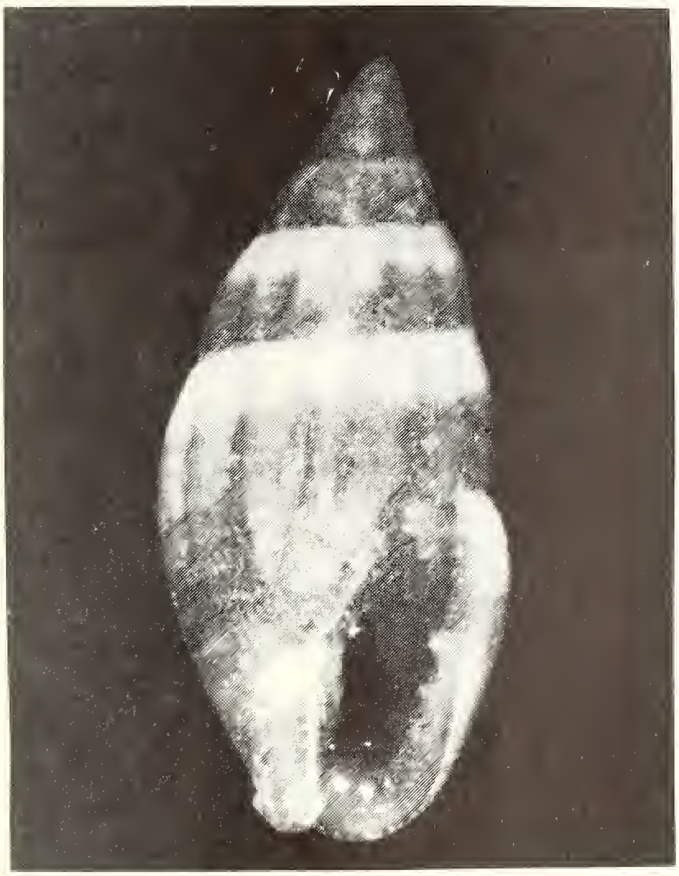

Fig. 4. *Anachis milium*, apertural view of specimen shown in top center in Figure 3. Length: 5.3 mm

Fig. 5. Dorsal view of specimen shown in Figure 4 and top center in Figure 3.

Literature Cited

BARTSCH, PAUL
1928. New marine mollusks from Ecuador. Jour. Washington Acad. Sci. 18:66-75, 16 figs. (Feb. 4).
DALL, WILLIAM H.
1916. Notes on West American Columbellidae. Nautilus 30(3):25-29 (July 14).
KEEN, A. MYRA
1971. SEA SHELLS OF TROPICAL WEST AMERICA; MARINE MOLLUSKS FROM BAJA CALIFORNIA TO PERU. Second Ed. Stanford Univ. Press, vii-xix +1064 pp. illus.
SOWERBY, G.B. JR.
[1844] 1847 Thesaurus Conchyliorum or monographs of genera of shells. Vol. 1 Monograph of the genus *Columbella* (1844) pp. 109-146.

FROM THE MINUTES - SAN DIEGO SHELL CLUB MEETING - 12 JUNE 1986

There was a good turnout for the program "Ancient Egypt and the Exotic Underwater World of the Red Sea" presented by Dave Mulliner and Bob Yin who spoke on their trip to the area in October 1985. The trip had been enjoyed by 15 people who went to dive, see the area and collect shells.

Beautiful slides of land and underwater subjects were shown: temples, the museum grounds, the bazaar, impressive granite columns, the dive boat and group, fish and mollusks in their habitat, and mollusks in captivity. A display of shells and art objects from their area was also brought in by the speakers. The presentation was thoroughly enjoyed by all.

The date September 27 was announced for the September party [not the 25th as published in the June issue of The Festivus]. The treasurer announced that 75% of the auction receipts have been collected so far.

President Richard Herrmann announced that a phone committee is being set up to remind persons of the meeting. A member is needed to phone north county members.

Barbara Farmer won the drawing.

Ginny Herrmann, Secretary

ABORIGINAL SHELL COLLECTORS

BY

HELEN DUSHANE

15012 El Soneto Drive, Whittier, California 90605

Long before G.B. Sowerby II thought of writing his erudite monograph on the genera of shells [1842] 1847-1887, known as THESAURUS CONCHYLIORUM, the original 75,000 native Indians of the 1,000 mile-long peninsula of Baja California were eating the mollusks and stringing the shells of the specimens they found along the sandy shores.

Along the eastern and western shores of Baja California, as well as inland, there are many vestiges of an earlier civilization. The long peninsula is peppered not only with Indian campsites, but along the beaches for miles there are remnants of an early culture.

In 1956, during the latter part of June and early July, our gypsy instincts led my husband and me to travel the length of this peninsula in a 1956 six cylinder Ford passenger car. The unpaved road stretched for interminable dusty, rutty miles and out of Punta Prieta we traveled for three days without seeing anyone or passing any habitation. After two weeks, on July fourth, we arrived in La Paz. The following morning we left for a short safari around the tip of Baja California Sur. It was between Los Barriles and Santiago, on Las Palmas Bay, that we stopped for a respite from the heat of the car. A few depauperate palm trees allowed us a small amount of shade. We ate a scanty lunch of crackers and cheese and it was while idly glancing about that we realized we were resting on an old Indian campsite. Our curiosity led us to gather the few obvious relics and place them in a container in the back of the car before continuing on our way toward Cabo San Lucas. On our arrival back in the United States the container was stored in the garage and forgotten until 30 years later when, in cleaning out the clutter, the container was rediscovered.

Through our own research and the knowledge of personnel at the Natural History Museum of Los Angeles County we have been able to determine not only what the items are, but something of the people who used them. The natives belonged to the "Pericues Nation, a tribe lowest in the cultural scale of the Amerindians," (Dunne 1952:6). They wandered constantly, always on the move in search of food. Of necessity, their personal possessions were few "a tray, a bowl, a small stick for making fires, a sharp bone which served as an awl, and two nets" (Dunne 1952:8) The Pericues wore their hair long, intertwined with small shells and pearls. Strings of beads "made of pearls, berries, white round shells from small snails, and pieces of shell and mother of pearl...were worn as bracelets, armlets and necklaces" (Dunne 1952:7-8). As history progressed, the Pericues became a mixture of native stock and Dutch, Filipino, English, and Negro and were given to uprisings and rebellion. They fought with their neighbors and resented the Jesuits who tried unsuccessfully to Christianize them. By 1748 the Pericues had been almost annihilated by war and plague and as a group the tribe had disappeared.

The following list of the artifacts we found in 1956 tells something of the culture of the people. The number in parentheses tells the quantity found.

Olivella dama shells bored for stringing (9)
Cassis coarctata shell bored for stringing (1)
Oliva spicata shells bored for stringing (2)
Columbella strombiformis shell bored for stringing (1)
Conus californicus shells bored for stringing (27). This is perhaps the most important find of the group since *C. californicus* Hinds, 1844 does not range commonly south of Magdalena Bay on the outer coast of Baja California. The numbers represented here indicate that the Pericues probably traded with

natives to the north.

Conus diadema shell bored for stringing (1)
Conus tiaratus shell bored for stringing (1)
Conus ximenes shell bored for stringing (1)
Donax gouldii shells bored for stringing (9)
Pinctada mazatlanica shell discs bored for stringing (2)
Pinctada mazatlanica shell: two broken specimens showing bored holes and ready to be cut into circular beads. This is the pearl shell to which Dunne (1952) refers, from which the natives obtained their pearls.

Among the non-mollusk artifacts were tubular glass beads, green glass beads, jaw bone of a large fish possibly used as a spoon, one small pointed bone awl, one large animal bone (deer or sheep?) with blunt pointed end, and a number of pottery sherds of varying ages.

All of these artifacts have been given to the Museo del Hombre, Naturolega y Cultura, Mexicali, Baja California Norte, Mexico. So little is known of the early inhabitants of Baja California that it is hoped that this small collection will aid in a measure to a better understanding of the way of life of the Pericues. Remnants such as these are slowly disappearing, either through the exigencies of weather or the development of hotels and recreational facilities for the ever increasing numbers of tourists.

Literature Cited

DUNNE, PETER MASTER S.J.
1952. BLACK ROBES IN CALIFORNIA. Univ. California Press, Berkeley and Los Angeles. 540 pp.

SOWERBY, G.B. II, ed.
[1842] 1847-1887. THESAURUS CONCHYLIORUM, or monographs of genera of shells. London. vols. 1-5.

CLUB NEWS

FOR YOUR INFORMATION

The Santa Barbara Shell Club in conjunction with the trustees of the Sara T. Delaney Scholarship fund are making available a research grant of up to $1400.00 to a full time graduate student whose thesis or dissertation topic is primarily focused on some aspect of eastern Pacific malacology with research currently in progress or beginning in the 1986-87 academic year.

Completed applications must be received no later than 10 October 1986. The complete announcement from the Santa Barbara Shell Club will be available at the July meeting. For further information contact Paul Scott (805) 682-4711.

Notice has been received that TROPICAL LANDSHELLS OF THE WORLD by B. Parkinson, J. Hemmen, K. Groh, edited by V.C. Hemmen is now available. The book, clothbound with 270 pages, has 77 color plates and other photos and treats about 1000 species and subspecies of about 100 genera. The notice with an example of a color plate will be at the July meeting.

NEW MEMBERS

Boehringer, Rose and Roger, P.O. Box 2080, Laguna Hills, CA 92654-2080
Santa Barbara Museum of Natural History, The library, 2559 Puesta Del Sol Rd., Santa Barbara, CA 93105

CHANGE OF ADDRESS

New Zealand Oceanographic Institute, c/o The Librarian, Private Bag, Kilbirnie, Wellington, New Zealand

THE FESTIVUS
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Annual dues are payable to San Diego Shell Club. Single member: $10.00; Family membership: $12.00 Overseas (surface mail): $12.00 Address all correspondence to the San Diego Shell Club, Inc., c/o 3883 Mt. Blackburn Ave., San Diego, CA 92111 Single copies of this issue: $5.00. Postage is additional.

Meeting date: third Thursday, 7:30 P.M. Room 104, Casa Del Prado, Balboa Park

The Festivus is published monthly except December. The publication date appears on the masthead above.

PROGRAM

"Chitons"

George Hanselman will present a slide program and discuss this beautiful and often neglected group of mollusks. His exquisite photography of the chitons will make this program a rare treat.

Meeting date: 21 August

Mark your calendar: The September party with a Baja theme will be held on the 27th of September. There is no regular September meeting.

CONTENTS

CLUB NEWS

FOR YOUR INFORMATION

The Nautilus, the 100 year old journal edited by Dr. R. Tucker Abbott, for 28 years, has been transferred to the non-profit Trophon Corporation of Maryland and will be edited by Dr. M.G. "Jerry" Harasewych of the Smithsonian Institution. Dr. Abbott will continue to serve as a consulting Associate Editor. Subscription and manuscripts should now be sent to The Nautilus, P.O. Box 3430, Silver Spring, MD 20901-0340. Back volumes will be available from Dr. W. Backhuys, P.O. Box 9000, 2300 Leiden, The Netherlands.

American Malacologists, Dr. R. Tucker Abbott's book publishing firm has opened a New England Division in Burlington, MA which will handle all future sales. His daughter, Cynthia Abbott, will fulfill orders for such books as COMPENDIUM OF SEASHELLS, SEASHELL TREASURES OF THE CARIBBEAN by Sutty, SEASHELLS OF BRAZIL by Rios, Bratcher and Cernohorsky's LIVING TEREBRAS OF THE WORLD and REGISTER OF AMERICAN MALACOLOGISTS. Book dealers contact American Malacologists at P.O. Box 1192, Burlington, MA 01803.

E.J. Brill, a Dutch publishing company has the back stock and rights to THE STANDARD CATALOG OF SHELLS and MONOGRAPHS OF MARINE MOLLUSCA and has placed the North American distribution rights to Dance's new HISTORY OF SHELL COLLECTING with American Malacologists. Bob Wagner will continue to edit World Size Records.

The Western Society of Malacologists will hold its 20th annual meeting in San Diego, California at San Diego State University from June 21-25, 1987. In addition to the regular program of contributed papers on Mollusca (terrestrial, fresh water and marine bivalves, gastropods and opisthobranchs) two special symposia are planned.

One symposium organized by Dr. Judith Terry Smith will discuss The Imperial Formation and the Northern Gulf of California--its Geology and Recent Mollusca. The second, organized by Dr. David L. Leighton, on Molluscan Aquaculture will examine the current research in this increasingly important area of malacology.

All persons interested in malacology, paleontology and/or conchology are invited to attend. For further information contact Carole M. Hertz, President WSM. Department of Marine Invertebrates, San Diego Natural History Museum, P.O. Box 1390, San Diego, California 92112. Telephone: (619) 232-3821 x228 or (619) 277-6259 (home).

FROM THE MINUTES - SAN DIEGO SHELL CLUB MEETING - JULY 17, 1986

Club Science Fair winner, Joshua Keller, a ninth grader at La Jolla High School gave members an overview of his winning project," The Effect of Acid Rain on Bivalve Mollusks." Joshua, who won fifth place in the Natural History category statewide, measured the effect of sulfuric acid in varying amounts on the common mussel, *Mytilus edulis*. He studied fecal production and the time it took the animal to consume all algae in a body of water. Joshua's presentation was articulate and interesting to all. He was presented with the book INVERTEBRATE ZOOLOGY. Joshua plans to continue his project for at least one more year.

Michael Lang, Master of Science candidate at SDSU, was the evening's speaker and he presented a fascinating program on cephalopods. He showed slides comparing several species of octopus by behavior, habitat, morphology and eggs. He also gave information on squid and cuttlefish.

The fall party, to be held at the home of Barbara and Wes Farmer on Saturday September 27, was discussed. The theme will be Baja, complete with Mexican style food, music, dress and entertainment. Further details and the planned menu will be announced at the August meeting.

Ginny Herrmann

A REVIEW OF THE NOMINAL SPECIES OF PSEUDOMELATOMA FROM THE WEST COAST OF CALIFORNIA AND BAJA CALIFORNIA, MEXICO (TURRIDAE: PSEUDOMELATOMINAE)

BY

JULES HERTZ

Department of Marine Invertebrates, San Diego Natural History Museum, Balboa Park, P.O. Box 1390, San Diego, California 92112

ABSTRACT All of the type specimens of the *Pseudomelatoma* species from the west coast of California and Baja California, Mexico are figured, some for the first time. The shell morphology and distribution for *Pseudomelatoma penicillata* (Carpenter, 1864); *P. moesta* (Carpenter, 1864); *P. maculata* (Williamson, 1905); *P. sticta* Berry, 1956; *P. eburnea* (Carpenter, 1865); *P. digna* (E.A. Smith, 1877); *P. grippi* (Dall, 1919); *P. torosa* (Carpenter, 1864) and *P. aurantia* (Carpenter, 1864) are reviewed. *P. penicillata, P. grippi,* and *P. torosa* are considered valid species and the others are placed in synonymy.

In reviewing the molluscan literature it becomes evident that there has been much confusion concerning the apparently frequently named species of *Pseudomelatoma* from the west coast of California and Baja California, Mexico. C.M. Hertz (1984) reported on *Pseudomelatoma sticta* Berry, 1956, and figured specimens from off the Coronado Islands, Mexico; off San Nicolas Island, California; and off Santa Catalina Island, California. She also included the following excerpt from a letter from Dr. James H. McLean of the Los Angeles County Museum of Natural History (LACM).

"Some years ago I concluded that *Pseudomelatoma sticta* was based on an extreme variant of *penicillata* in which the nodes become obsolete at an early stage. The color pattern is one that shows up on noded specimens from time to time. It also seems to me that *torosa* in the north and *penicillata* in the south are the geographic extremes (subspecies perhaps) of one broad ranging species." This statement piqued my interest in the west coast *Pseudomelatoma* species.

Dall (1918:317) established the genus *Pseudomelatoma* with the following statement. "There is a group of species typified by *Pleurotoma penicillata* Carpenter which in sculpture and periostracum closely resemble the African *Melatoma*, but their operculum has an apical nucleus and is long and narrow. This may be called *Pseudomelatoma*. *Melatoma* Anthony, 1847, is quite a different thing."

Pseudomelatoma penicillata (Carpenter, 1864)
Figures 1 to 35

Carpenter (1864:657, 658, 668) under the family Pleurotomidae briefly described *Drillia moesta, Drillia torosa, Drillia* ?var. *aurantia,* and *Drillia penicillata* and proposed the name *Drillia eburnea*. The original Carpenter description for *Drillia penicillata* follows:

"375. *Drillia penicillata,* N.S. Like *inermis*, with delicate brownish pencillings." Carpenter (1865b:146) gave the following more detailed description of *Drillia penicillata* in the Journal de Conchyliologie:

19. Drillia penicillata.

D. t. • D. inermi • forma et indole simili; sed cinerea, rufo-fusco dense penicillata; lineolis creberrimis, interdum diagonalibus, seu zic-zaciformibus, seu varie interruptis; anfractibus planatis, plicato-costatis, costulis circiter 14, regione sinus minimi, lati, expansi interruptis,

postice nodosis; canali effusa.—Long. 1·35, *long. spir.* ·75, *lat.* ·42, *poll. : div.* 25°.

Hab. Cerros Is., basse Californie, *Veatch.*

Tous les individus que j'ai vus de cette espèce étaient excessivement roulés, mais on peut la reconnaître très-facilement à sa coloration élégante.

The following translation for Carpenter's Latin description was given by Grant & Gale (1931:560).

Drillia, shell in form and in nature like that of *Drillia inermis;* but ashy, with close-set, dark reddish-brown peneillings; with very numerous little lines, sometimes diagonal, sometimes zigzagged or interrupted in various ways; whorls flattened, with plications or costæ, about 14 in number, interrupted in the region of the very small, wide, dilating sinus, nodose posteriorly; canal broad. Length, 1.35; length of spire, .75; width, .42 inches; angle, 25°.

Habitat: Cedros Island, Lower California.

All the individuals that I have seen of this species were excessively worn; but it can be recognized very easily by its elegant coloration.

Dall (1919:21) stated, "The poor condition of Carpenter's unfigured type specimen led to the belief that it was best to figure a perfect if somewhat immature example. The name had been variously applied, especially to forms of *Moniliopsis*, in ignorance of the true character of the species." Dall's specimen (1919, pl. 2, fig. 3), although perfect, still left workers such as Grant and Gale (1931) perplexed since Dall's specimen does not appear to have the "numerous little lines, sometimes diagonal, sometimes zigzagged or interrupted in various ways" that was so strongly emphasized by Carpenter in his name and description. This led to general confusion, *i.e.* that the original specimen might have been a worn specimen of what now is considered *Ophiodermella ophioderma* (Dall, 1908). Tryon (1884:183, pl. 12, fig. 40) also confused *P. penicillata* with what is now considered to be *O. ophioderma*. Figures 1 and 2 are photographs of the previously unfigured type specimen of *Drillia penicillata* Carpenter, 1864 (USNM 6320). Note that the distinguishing characteristics as defined in Carpenter's 1865 description are clearly discernable. Had this shell been figured earlier, it would have prevented a great deal of conjecture by later workers.

The following description of *Pseudomelatoma penicillata* was given by Grant & Gale (1931).

Shell of medium size and thickness; sculpture on the whorls of the spire consisting of 11 to 16 long, sharp, slightly oblique, longitudinal costæ, with a corresponding subsutural band of low, rounded nodes, sculpture on the body whorl of the adult practically obsolete; aperture lenticular, notch shallow and situated high on the outer lip, canal indistinctly defined, of moderate width, columella fairly long, slender, simple; operculum horny, with a terminal nucleus.

Dimensions: Altitude, 37 mm.; length of aperture, 15 mm.; diameter of body whorl ,13 mm.The largest specimen examined had an altitude of about 45 mm. and a heavier shell.

Hertz & Hertz (1984) reported that *Pseudomelatoma penicillata* (Carpenter, 1864) was one of the more common intertidal species collected at Punta Asunción, Baja California Sur, Mexico during a visit to that area in November 1981. The largest specimen found measured 33.4 mm. Figure 3 shows a form which is unpatterned but strongly ribbed under an olive brown periostracum. The specimen was collected by David K. Mulliner in 26-32 meters, but others were found intertidally. The more common form found at Punta Asunción is shown in Figure 4. This closely resembles Carpenter's worn type. Approximately eight specimens were found with zigzag markings to every one without pattern. Both forms had strongly adhering periostracum. Dall's (1919) figured specimen looks like the unpatterned specimens found by Hertz & Hertz (1984) at Punta Asunción. Figure 5 shows specimens of both forms of *P. penicillata* after approximately one month in a 50 percent solution of household bleach (5.25% sodium hypochlorite). This figure more clearly delineates the sculpture and markings of the two forms of *P. penicillata*. The amount of sculpture on the body whorl of the specimens found at Punta Asunción varied from numerous strong

Fig. 1. *Pseudomelatoma penicillata* (Carpenter, 1864). Apertural view of type specimen of *Drillia penicillata* Carpenter, 1864 (USNM 6320)

Fig. 2. Dorsal view of specimen shown in Figure 1. Length: 34.3 mm Type loc.: Cerros Id.

Fig. 3. Living specimen of *Pseudomelatoma penicillata* from 26-32 meters off Punta Asunción, unpatterned form Reproduced from Hertz & Hertz (1984).

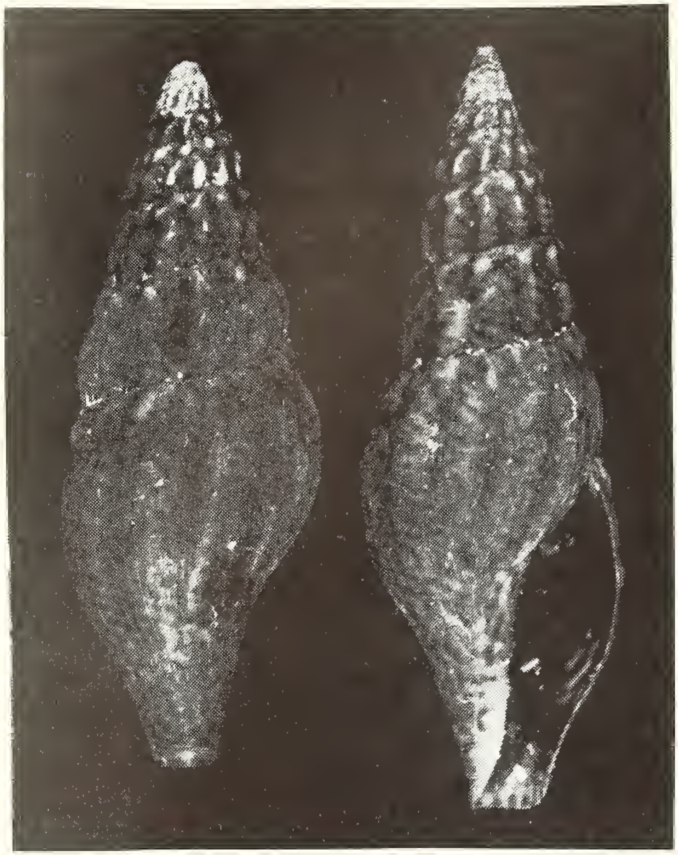

Fig. 4. Dorsal and apertural views of common form of *P. penicillata* found at Punta Asunción.

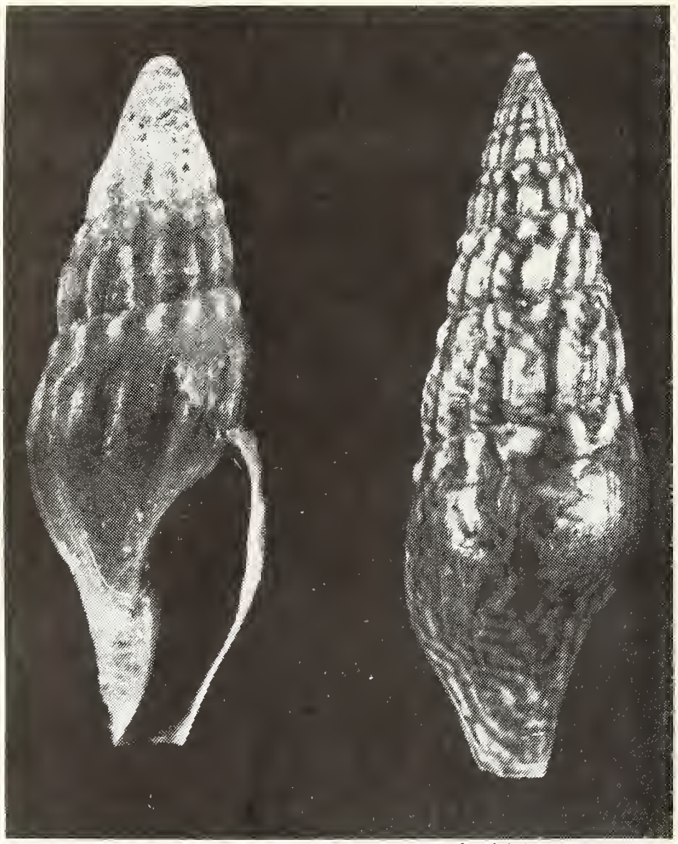

Fig. 5. Two forms of *P. penicillata* (Left: unpatterned, 27.8 mm L Right: zigzag markings, 29.1 mm L)

costae to just indications of costae on the posterior of the body whorl. However, contrary to Grant & Gale's (1931) general description, most shells had strong sculpture on the body whorl.

Figure 6 shows two specimens of *Pseudomelatoma penicillata* collected by David Myers in October 1981 while diving off Punta Banda, Baja California Norte, Mexico. The pattern on these specimens shows more resemblance to the type specimen (from Cedros Island) than do the specimens from Punta Asunción.

The type locality for *P. penicillata* is variously listed as either Cedros Island or Cerros Island. The original Carpenter (1864:664, 665) reference lists *P. penicillata* from Cerros Island (lat. 28°) and he continued to call it Cerros Island in his description of *P penicillata* (1856b). Dall continued the use of the type locality as Cerros Island, but later authors have called it Cedros Island. I have not been able to determine whether there was a typographical error originally or whether there was a change in spelling.

Fig. 6. Two specimens of *P. penicillata* from Punta Banda (Left: 15.5 mm L; Right: 24.6 mm L)

Current maps list the island as Isla Cedros or Isla de Cedros.

Figure 7 is a drawing showing the protoconch of a juvenile specimen of *P. penicillata* from Punta Asuncion.

McLean (1971:fig. 1) figured the radula of a specimen of *P. penicillata* from Punta San Bartolome, Baja California, Mexico. The radula of *Pseudomelatoma* had been discussed earlier by Morrison (1966:2) and figured and discussed by Powell (1966:33, figs. B27-29) who noted that the *Pseudomelatoma* radula consists of a "large rectangular based unicuspid central tooth and a pair of massive marginals, gradually tapered to a simple sharp point." Earlier Burch (1945(49):46) illustrated the central and lateral teeth of *P. torosa*. Morrison (1966) established the subfamily Pseudomelatominae based on this radula structure being so unusual for turrids. McLean (1971:116) gives a diagnosis for the Pseudomelatominae.

Carpenter (1864:657) described a second species of the family Pleurotomidae, *Drillia moesta*, as follows:

"Like large luctuosa; middle whirls with long transverse ribs and posterior knobs: adult obsolete." Carpenter (1865a:181, 182) further described *Drillia moesta* as follows:

373. *Drillia mœsta.*

D. testa acuminata, lævi, dense olivaceo-fusca, epidermide lævi adhærente induta; anfr. nucleosis?...(decollatis); norm. viii., parum excurvatis, suturis parum distinctis; testa adolescente costis radiantibus circ. x., subobsoletis, elongatis, arcuatis, sinum versus interruptis, postice nodosis; anfr. ult. sculptura nulla; apertura elongata; canali brevi, aperto; columella recta; labio tenui; labro acuto, suturam versus sinuato, sinu parvo, expanso; operculo normali. Long. 1·1, long. spir. ·65, lat. ·36, div. 27°.

Hab. Sta. Barbara (*Jewett*); S. Pedro (*Cooper*).

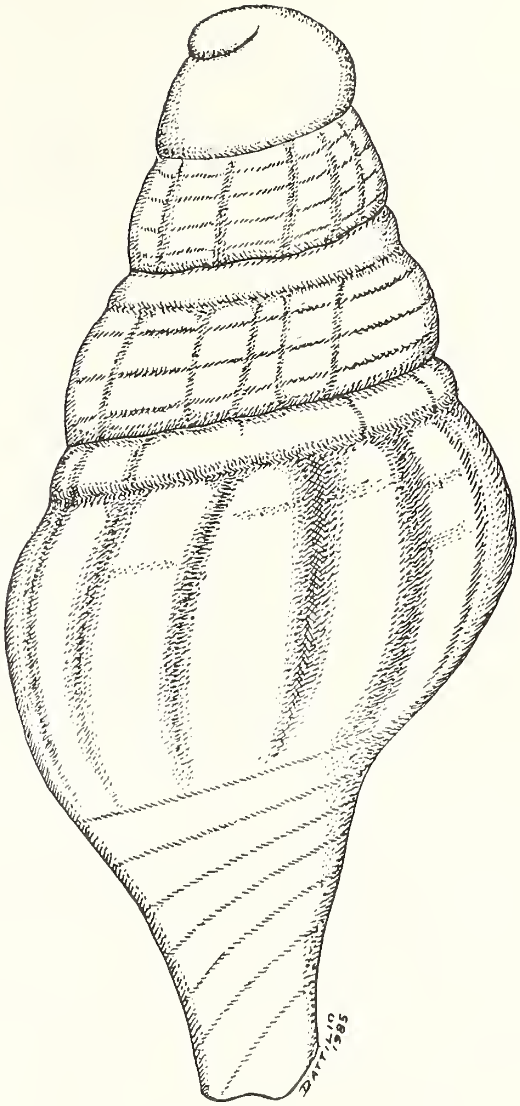

Fig. 7. Juvenile specimen (4.7 mm) of *P. penicillata* from Punta Asunción showing protoconch

The type of *Drillia moesta* Carpenter, 1864 is shown in Figures 8 and 9. Its appearance is that of an unpatterned *Pseudomelatoma penicillata*. The accompanying museum label indicates that the shell was selected as "lectotype by J.H. McLean, Oct. 1969 Paratype (1) 697393."

Figures 10 and 11 show a good representative specimen of "*P. moesta*" collected intertidally in sand on June 10, 1967 at La Jolla, California. This is one of a series of eight shells in the lot and is characterized by obscure sculpture on the body whorl. The subsutural band of low, rounded nodes is generally lacking or greatly subdued. The labial sinus is more distinct and deeper than on the specimens of *P. penicillata* collected from Punta Asunción.

A number of additional lots of specimens similar to the one shown in Figures 10 and 11 have been collected by the author at the north end of Tourmaline Surfing Beach, Pacific Beach, San Diego, California and the beach south of the La Jolla Beach and Tennis Club, La Jolla, California. The largest specimen found measured 34.1 mm. The horny operculum of these specimens has a terminal nucleus and is typical of *Pseudomelatoma* species.

Fig. 8. *Pseudomelatoma penicillata* (Carpenter, 1864). Apertural view of *Drillia moesta* Carpenter, 1864 (USNM 14942)

Fig. 9. Dorsal view of specimen shown in Figure 8. Length: 27.9 mm
Type loc: Santa Barbara, California

Fig. 10. *P. penicillata* (Carpenter, 1864). Apertural view of *P. moesta* from La Jolla, California. Hertz collection

Fig. 11. Dorsal view of specimen shown in Figure 10. Length: 27.3 mm

The lack of sculpture on the body whorl and the lack of pattern are the only features in Carpenter's description of *Drillia moesta* distinguishing this species from *D. penicillata*. Based on the large series of specimens collected at Punta Asunción, pattern and amount of body sculpture appear variable within a single population. I therefore consider *Pseudomelatoma penicillata* and *P. moesta* synonymous. Both were named by Carpenter in the same work.

Grant & Gale (1931:561) also considered *P. moesta* to be a variety of *P. penicillata* and gave the following general description. "Shell like that of the typical variety, but slightly smaller and with a tendency for the sculpture to become obsolete earlier."

Since Dall (1918) established *P. penicillata* as the type of *Pseudomelatoma*, it is the preferred name.

C.M. Hertz (1984) reported on *Pseudomelatoma sticta* Berry, 1956, and figured specimens from off the Coronado Islands, Mexico; off San Nicolas Island, California; and off Santa Catalina Island, California. Berry's (1956:156) description of *P. sticta* follows. Two views of the holotype are shown in Figures 12 and 13. The paratype for *P. sticta*, now in the Santa Barbara Museum of Natural History is numbered SBMNH 34285.

Pseudomelatoma sticta, n. sp.

Figs. 3–6

Shell of moderate size, elongate-fusiform, with tall, sharply conic spire; whorls 9+, slightly constricted in front of the suture, the anteriorly thrust periphery smoothly convex; suture sharply defined; first nepionic whorl and a quarter smooth, mammillate; succeeding whorl rather abruptly showing about 6 fairly sharp spiral grooves and about 10 strong protractive axial ribs which do not cross the fasciole; although remaining strong for yet another whorl or so, all this sculpture gradually tends thereafter to obsolescence except at the periphery where the ribs persist as low rounded knobs, the number of which to a whorl remains about the same until the body whorl is reached, when the entire later portion becomes practically smooth; spiral grooving particularly strong on the base of adolescent shells, but even in this region represented only by traces on such a fully mature shell as the holotype. Aperture elongate-pyriform, about 38 percent of the height of the shell, widest posteriorly, its posterior angle acute; outer lip moderately thick, sharp-edged, unarmored, produced anteriorly into the short, open, very slightly recurved canal; inner lip and

Measurements: Holotype—altitude 29.5; maximum diameter 9.2; altitude of aperture 11.2; diameter of aperture 4.4 mm. Paratype—altitude 17.3; maximum diameter 6.5; altitude of aperture 7.3, diameter of aperture 2.8 mm.

Holotype: Berry Collection no. 23785. *Paratype:* Berry Collection no. 23584.

Type locality: 26–27 fathoms, Anacapa Passage, Calif.; 2 specimens, *Orca*, July 2, 1951.

Commentary: Even amid the graceful family of the turrids this is a trimly elegant species, characterized by the down-sagging (or anteriorly thrust) noded convexity of the whorls comprising the spire, by the eventual obsolescence of the originally sharp axial and spiral sculpture, and by the neatly speckled color pattern. These features separate it from all other members of the genus *Pseudomelatoma*, with which its present affiliation can be only tentative in the absence of any knowledge of the animal and particularly of its radula. The shells of both holotype and paratype were almost completely covered by a heavy whitish bloom, apparently limy and perhaps algal, which proved exceedingly difficult of even incomplete removal.

The specific name is the Latin *stictus*, dotted, and has reference to the speckled color pattern of the shell.

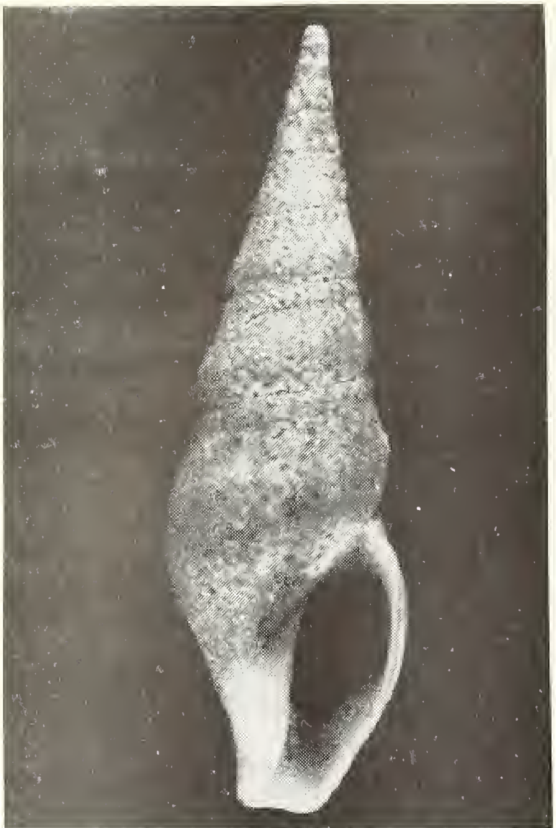

Fig. 12. *P. penicillata* (Carpenter, 1864). Apertural view of holotype of *P. sticta* Berry, 1956 (SBMNH 34072) Length: 29.5 mm

Fig. 13. Dorsal view of specimen shown in Figure 12. (Berry coll. no. 23785) Type loc.: Anacapa Passage, California

Figures 14 to 16 show specimens of *Pseudomelatoma sticta* collected in 65 to 80 feet of water by John Myers off Bird Rock, La Jolla, California. Figures 17 and 18 are apertural and dorsal views of a similar specimen collected intertidally by Barbara Myers at Pt. Loma, San Diego, California. These all have the smooth body surface and fairly sharp spiral grooves on the early whorls. The specimen shown in Figures 15 and 16 has a smooth body whorl and axial sculpture similar to that of *P. moesta* and the dots and spiral sculpture on the early whorls characteristic of the type description of *P. sticta*. However, it lacks the knobby appearance of the axial ribs of the holotype shown in Figures 12 and 13 and specimens (Figures 19 to 24) previously figured by C.M. Hertz (1984). The knobby ribs and the spiral sculpture are two characteristics of *Pseudomelatoma torosa* (Carpenter, 1864), although in *P. torosa* these characters are also found on the body whorl. The

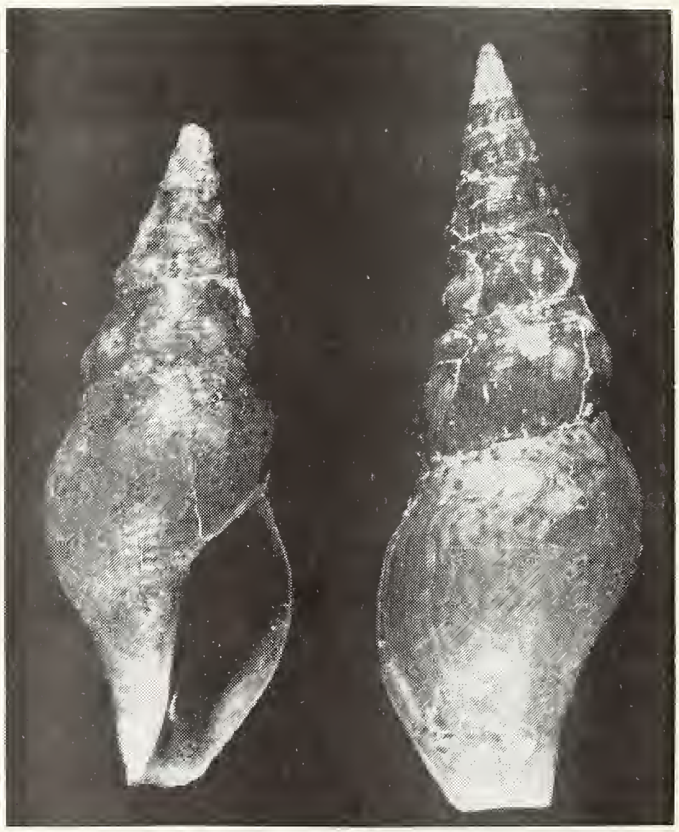

Fig. 14. *P. penicillata* (Carpenter, 1864). Specimens of *P. sticta;* B. Myers collection Leg. J. Myers, 75-80 ft., off Bird Rock, La Jolla, California, June 1973 Lengths: 24.2 and 27.4 mm

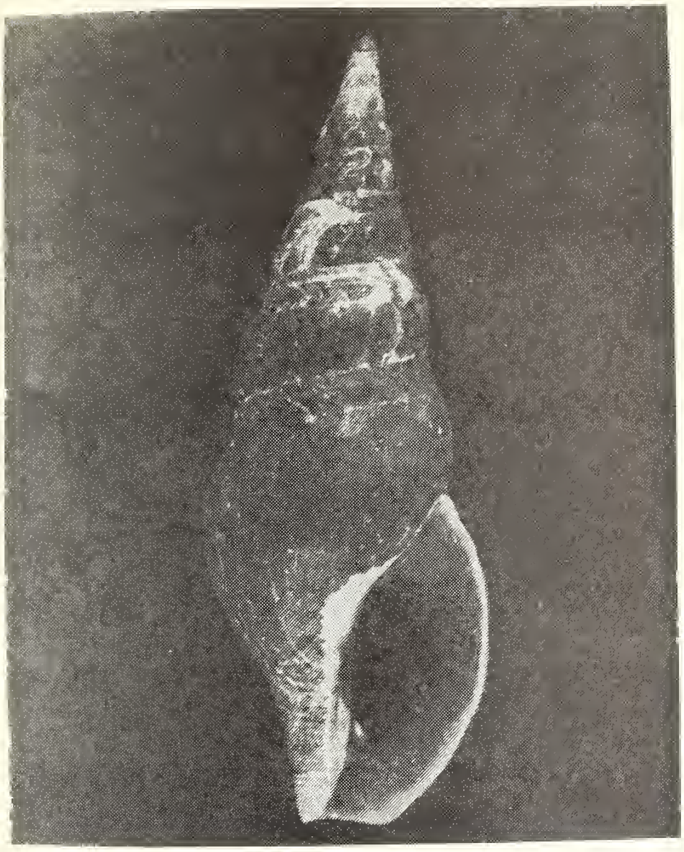

Fig. 15. *P. penicillata* (Carpenter, 1864). Apertural view of *P. sticta* Berry, 1956, Leg. J. Myers, February 1972. Length: 32.5 mm

Fig. 16. Dorsal view of specimen shown in Figure 15. Collected off Bird Rock, La Jolla California in 65 feet. B. Myers collection

Fig. 17. *P. penicillata* (Carpenter, 1864). Leg. B. Myers, intertidal at Point Loma, San Diego, California. October 1970

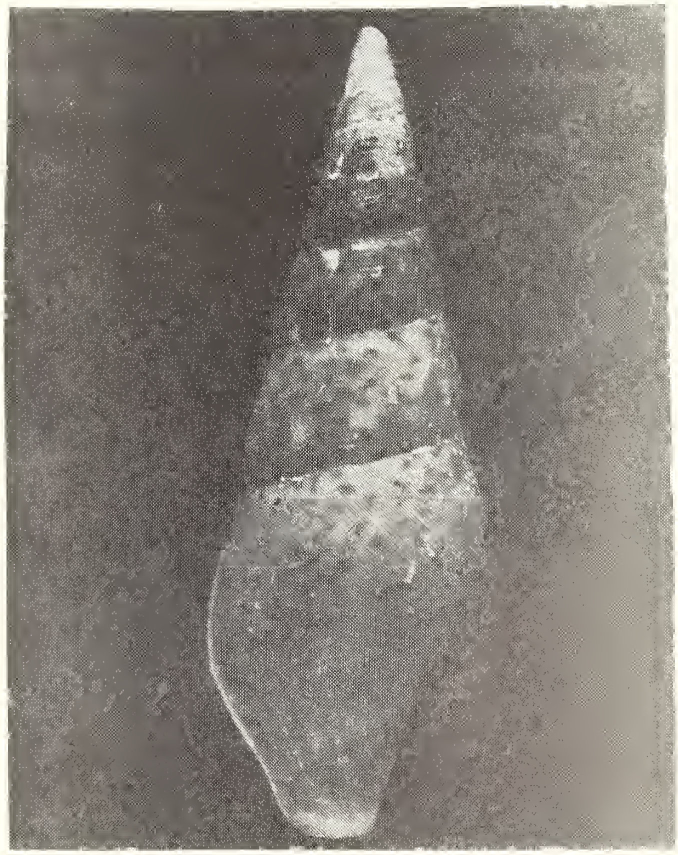

Fig. 18. Dorsal view of specimen shown in Figure 17. Length: 15.8 mm

Fig. 19. *P. penicillata* (Carpenter, 1864). Apertural view of *P. sticta* from the Coronado Islands, Mexico. Leg. Bob Yin

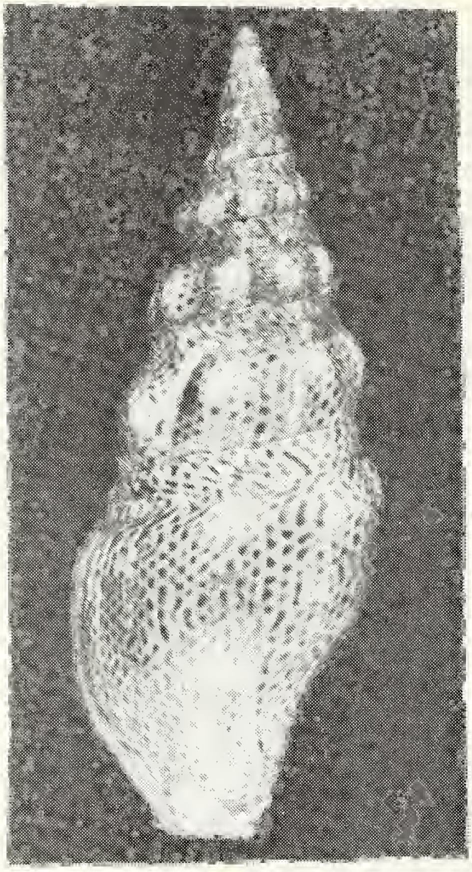

Fig. 20. Dorsal view of specimen shown in Figure 19. From C.M. Hertz (1984)

Fig. 21. *P. penicillata* (Carpenter, 1864). from San Nicolas Is., California

Fig. 22. Dorsal view of specimen shown in Figure 20 (LACM 109457). From C.M. Hertz (1984)

Fig. 23. *P. penicillata* (Carpenter, 1864). Apertural view of *P. sticta* from Farnsworth Bank, Santa Catalina Is., California in 80 to 100 feet.

Fig. 24. Dorsal view of specimen shown in Figure 23 (LACM 65-32). From C.M. Hertz (1984)

smaller specimen of *P. sticta* in Figure 14 shows faint spiral grooving on the body whorl. Therefore *P. sticta* looks like a link between *P. moesta* and *P. torosa* (discussed later, see page 122).

Williamson (1905:122,123) named a variety of *Drillia moesta* as *Drillia moesta* var. *maculata* with the following background information and description.

> **Drillia moesta** var. **maculata** var. nov.
>
> Pt. Fermin, Los Angeles County.
>
> Some years ago Dr. J. G. Cooper labelled this specimen **Drillia torosa** variety, and it is listed as such in my "Annotated List of the Shells of San Pedro Bay and Vicinity," (Proc. U. S. Nat. Mus. Vol. XV) page 208. The polished surface of this pretty shell—being more porcellanous than most of our California Drillias—the ground work bluish white with a yellowish band around each suture, also appearing in the body-whorl, the whole shell dotted, or spotted, with tiny, distinct spots mark it a definite variety from the type. Being covered with brown spots gives the shell a much darker appearance than **hemphilli**, another porcellanous form. In form, this var. is like **moesta**, or **maesta**, but the revolving ribs are more nodose, nearer like torosa, and less oblique; on the first three apical whorls these nodules are very faint and are not constant upon the body-whorl—disappearing upon part of it As in **moesta** the ribs, or nodules, are lighter colored—showing the bluish white foundation. The suture is compressed and distinct and is tuberculated as in **moesta**, in this respect differing from **torosa**.
>
> As the outer lip was broken—three specimens were collected the same day, all with the aperture imperfect—no description of this part can be given. I only retained one specimen for my cabinet. Prof. Keep refers to a variety of **moesta** which he says "is smooth, with fine color lines." He gives San Pedro as the locality. I have no personal knowledge of other than the three I collected at the Point.

Figure 25 shows the holotype of *Drillia moesta* var. *maculata* Williamson, 1905 (LACM 1052) collected at Point Fermin Los Angeles County, California. The photograph was kindly provided by James H. McLean of the Los Angeles County Museum of Natural History.

Based on the description and picture of *Pseudomelatoma moesta maculata* (Williamson, 1905), it appears that *P. sticta* Berry, 1956 is a synonym of *P. (m.) maculata*. As noted by Williamson, *maculata* has characteristics of both *moesta* and *torosa*.

McLean in Keen (1971:69) included *Drillia eburnea* Carpenter, 1865 (name proposed by Carpenter in 1864:668 without figure or description) and *Pleurotoma digna* E.A. Smith, 1877 as synonyms for *Pseudomelatoma penicillata*. The original Latin description for *Pleurotoma (Drillia) digna* follows along with Smith's (1877:499) generalized English translation.

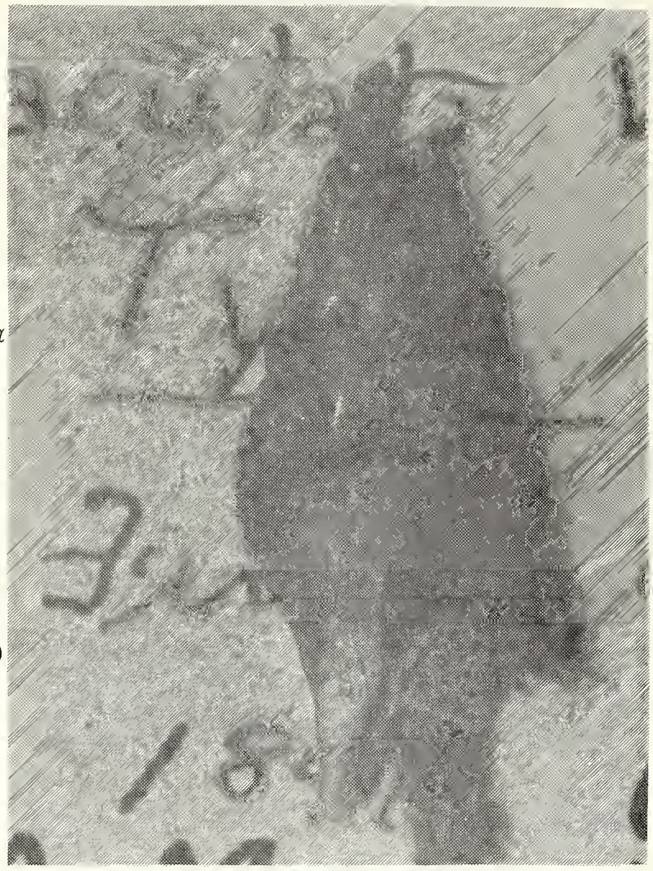

Fig. 25. *P. penicillata* (Carpenter, 1864). Holotype of *Drillia moesta* var. *maculata* Williamson, 1905 (LACM 1052)
Type loc.: Point Fermin, Los Angeles County, California .
Length: 20 mm (Williamson 1905)

Pleurotoma (*Drillia*) *digna*.

Testa ovato-fusiformis, sub epidermide tenui flavo-olivacea cæruleocinerea; anfractus 9, leviter convexi, costis obliquis superne nodosis 13–14 (in anfr. ultimo versus labrum subobsoletis et prope peripheriam evanidis) instructi; anfr. ultimus sulcis angustis pluribus circa basim insculptus; apertura fusca, albobifasciata, longitudinis totius quam ½ paulo minor; labrum tenue, ad marginem album, superne minime profunde sinuatum; columella versus basin callo albo induta; canalis breviusculus, latus. Long. 26 mill., diam. 9.

Hab. California.

The colour beneath the epidermis of a specimen in good condition is a bluish ash; but in worn examples the upper part of the whorls and the middle of the body-whorl are broadly banded with brown; and these bands are seen in the aperture of all specimens. A slight furrow or depression extends around the whorls a little below the suture, and, traversing the ribs, causes their upper ends to be nodulous. The sinus in the labrum is situated at the termination of this depression.

The general description could be used for *Pseudomelatoma penicillata* except for the bluish-ash color under the thin yellow-olive periostracum and the brown banding in the middle of the body whorl. The lots of *P. moesta* collected by this author at La Jolla, California and typified by the specimen shown in Figures 10 and 11 have the thin olivaceous periostracum over a bluish-ash shell. The author also has specimens of *Pseudomelatoma torosa* which have a brown periostracum over a blue-white shell. Of the many lots of *Pseudomelatoma* reviewed (complete collection of the San Diego Natural History Museum, Hertz collection and part of the Myers collection), only *Pseudomelatoma grippi* (Dall, 1919) specimens have both the brown banding and the banding in the aperture noted by E.A. Smith. The holotype of *P. sticta* has the banding in the aperture. The syntypes of *Pleurotoma (Drillia) digna* are shown in Figure 26. Figure 27 shows the labial sinus of *Pleurotoma digna*. The three syntypes of *P. digna* are very worn and colors and bands may not be representative of live collected specimens. The original label from the British

Fig. 26. *P. penicillata* (Carpenter, 1864). Syntypes of *Pleurotoma (Drillia) digna* E.A. Smith, 1877
Lengths (left to right): 23.3, 26.0, 28.3 mm
Photos in Figs. 26 and 27 published courtesy of the British Museum of Natural History

Fig. 27. Side view of syntype of *P. digna* showing labial sinus

Museum of Natural History states "not *penicillata* Cpr *teste* Cpr 1870." Carpenter may not have realized the variability of *Drillia penicillata* and may have limited his interpretation of this species to those specimens having "numerous little lines, sometimes diagonal, sometimes zigzagged or interrupted in various ways." I agree with McLean in Keen (1971:690) that *Pleurotoma digna* is a synonym of *Pseudomelatoma penicillata* (Carpenter, 1864).

Carpenter (1864:668) proposed the name *Drillia eburnea*, but it wasn't until 1865 that he described the species (1865a:181-182). The original Carpenter description follows.

DRILLIA EBURNEA.

D. *t. turrita, carneo-albida, tenuiore, lævi, maxime nitente; marginibus spiræ rectis; anfr. nucl.? . . . [decollatis]; norm. circ.* ix., *postice planatis, supra suturas appressis, medio satis excurvatis; hic et illic rugis radiantibus, obsoletis, irregularibus exsculpta; basi prolongata, canali conspicuo, aperto; sinu postico minore, in sulco lato, haud definito, spiram ascendente sito; labro acuto; labio indistincto; columella planata.*
Long. 1·3, long. spir. ·8, lat. ·45; div. 30°.
Hab. Near Gulf of California (teste *Rowell*).
Easily recognized by its smooth glossy aspect and French-white colour; the notch lying along a broad spiral channel, which throws the junction of the whorl as it were up the suture.

Dall (1919:19, pl. 13, fig. 5) redescribed and figured the type, and the description follows.

? CLATHRODRILLIA (LAEVITECTUM) EBURNEA Carpenter.

Plate 13. fig. 5.

Drillia eburnea CARPENTER, Proc. Zool. Soc. London, 1865, p. 280; not *Pleurotoma eburnea* Bonelli. 1842.

This differs from all the other species of the group in having all the sculpture obsolete, so that the shell except on very close scrutiny appears perfectly smooth except near the apex. The color is a pinkish white, with a brownish decollate apex. I have been puzzled where to put it, as it combines characters of several groups but feebly expressed.

Range.—Gulf of California. Rowell. Type, Cat. No. 22817, U.S.N.M.

Dall thus erected the subgenus *Laevitectum* in 1919 with *Drillia eburnea* Carpenter the type by monotypy. Grant and Gale (1931:564) postulated that *Pseudomelatoma (Laevitectum) eburnea* "may be only an unusually smooth specimen of *penicillata*, for a number of forms of *penicillata* have several of the whorls of the spire, as well as the body whorl, smooth."

Figures 28 and 29 are photographs of the type specimen of *Drillia eburnea* (USNM 22817), type locality listed as Gulf of California. Two of the lots in the San Diego Natural History Museum contained specimens that look like the type of *Drillia eburnea*. Both lots, SDNHM 22250 and SDNHM 41614, were collected at Magdalena Bay, Baja California Sur, Mexico.

Fig. 28. *P. penicillata* (Carpenter, 1864). Apertural view of type specimen of *Drillia eburnea* Carpenter, 1865 (USNM 22817). Length: 28.7 mm

Fig. 29. Dorsal view of specimen shown in Figure 28. Type loc.: Gulf of California

Figures 30 and 31 show a specimen from lot SDNHM 22250 listed originally as *Pseudomelatoma moesta*. This specimen which has little axial sculpture appears quite similar to the smooth specimen from La Jolla, California shown in Figures 10 and 11. The specimen from Magdalena Bay seems to be a stouter shell having a broader body whorl with the whorls somewhat flattened posteriorly and similar to the type of *Drillia eburnea*.

Fig. 30. *P. penicillata* (Carpenter, 1864). Apertural view of *P. eburnea* (SDNHM 22250) Loc.: Magdalena Bay, Baja California Sur, Mexico

Fig. 31. Dorsal view of specimen shown in Figure 30. Length: 24.9 mm

SDNHM lot 41614 consisted of two specimens collected by C.R. Orcutt (shown in Figures 32 and 33) both having similar appearance to the specimen shown in Figures 30 and 31 and both appearing to have been live collected. Lot 22250 contained six other specimens in addition to the one shown in Figures 30 and 31 which appear to be another form of *P. penicillata*. One of these six specimens is shown in Figures 34 and 35. It differs from typical *P. penicillata* in being short, having a broad body whorl, more axial ribs on the body whorl, and a deeper, more distinct labial sinus.

I consider *Pseudomelatoma (Laevitectum) eburnea* a synonym of *P. penicillata*.

Pseudomelatoma grippi (Dall, 1919)
Figures 36 to 42

Dall (1919:27, pl. 8 fig. 2) described and figured *Moniliopsis grippi* from a specimen collected at San Diego, California. The original description follows, and the type specimen is shown in Figures 36 and 37.

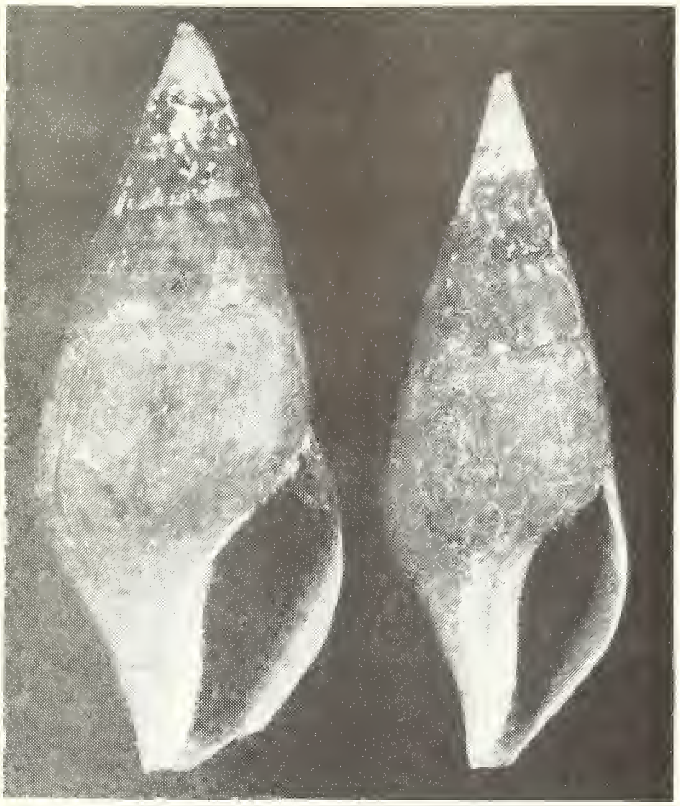

Fig. 32. *P. penicillata* (Carpenter, 1864). Apertural view of *P. eburnea* specimens (SDNHM 41614) Lengths: 25.5 & 23.7 mm

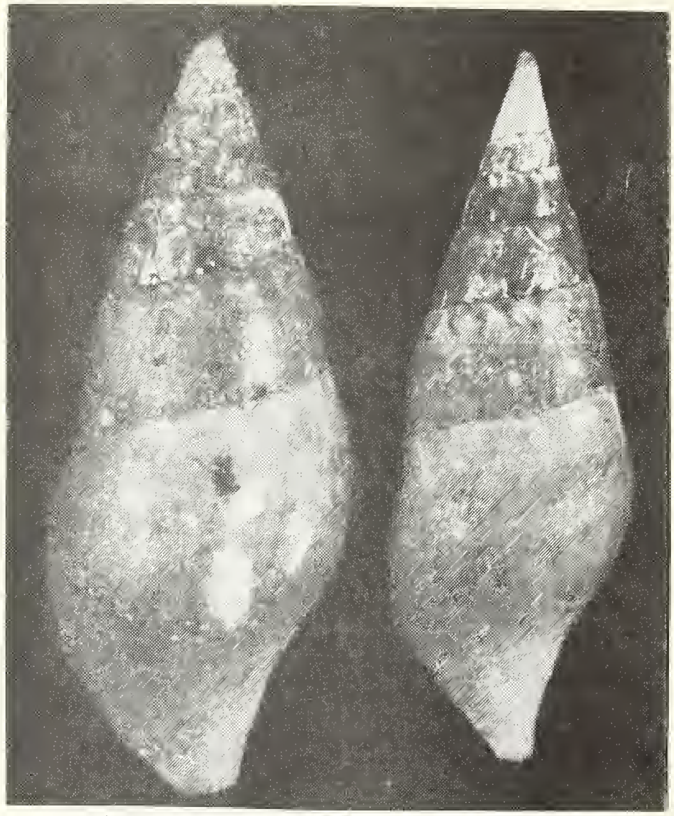

Fig. 33. Dorsal view of specimens shown in Figure 32. Loc.: Magdalena Bay, Baja California, Mexico. Leg. C.R, Orcutt

Fig. 34. *P. penicillata* (Carpenter, 1864). Apertural view of specimen from Magdalena Bay which may be a form of *P. penicillata*.

Fig. 35. Dorsal view of specimen shown in Figure 34. (SDNHM 22250) Length: 16.2 mm

MONILIOPSIS GRIPPI, new species.

Plate 8, fig. 2.

Shell slender with about eight (slightly decollate) whorls, livid olivaceous with a pale peripheral band, lighter near the aperture; suture appressed, on the upper whorls rudely nodulous; spiral sculpture in front of the fasciole on the spire of five or six strong cords with narrower interspaces, overriding the ribs; the cords cover the last whorl, feebler on the periphery, coarser on the base; there are also faint spiral striae here and there; axial sculpture on the upper part of the spire 14 or 15 strong rounded ribs with wider interspaces, feebler on the penultimate, obsolete on the last whorl; aperture ovate, anal sulcus conspicuous, shallow; outer lip thin, simple, inner lip smooth, canal short, wide, not recurved. Height of shell, 27; of last whorl, 16; diameter, 10 mm. Cat. No. 203670, U.S.N.M.

Range.—San Diego, California; collected by the late C. W. Gripp.

Verging toward *Clathrodrillia*, but nearer to such species as *Moniliopsis cancellata* Carpenter.

Fig. 36. *Pseudomelatoma grippi* (Dall, 1919). Apertural view of type of *Moniliopsis grippi* Dall, 1919 (USNM 203670)

Fig. 37. Dorsal view of specimen shown in Figure 36. Length: 26.8 mm Type loc.: San Diego, California

A specimen collected by John Myers in 45 ft. of water off Catalina Island, California is shown in Figures 38 and 39. Grant and Gale (1931:565) gave the following description for *Moniliopsis grippi*.

"Shell having the shape of *Pseudomelatoma*, though smaller and more delicate; early whorls sculptured with 14 or 15 strong, rounded ribs and a corresponding row of nodes above the anal fasciole as in *Pseudomelatoma*, *s.s.*, all whorls sculptured with revolving, incised lines as in *Moniliopsis incisa*, the lines passing over the ribs of the early whorls; columella straight, aperture broad, rounding anteriorly as in *Pseudomelatoma*, anterior canal not defined."

Grant and Gale considered *M. grippi* as a species bridging the gap between *Moniliopsis* and *Pseudomelatoma* with the strength of the spiral sculpture and the more delicate shell construction influencing them to place it in *Moniliopsis*. McLean (1978:53, fig. 29.4) placed *grippi* in *Pseudomelatoma*. He noted that *P. grippi* was grayish and "sometimes with spots or linear markings under a closely adherent yellowish periostracum."

Figures 40 and 41 show a juvenile specimen of *Pseudomelatoma grippi* collected intertidally by J. Hertz at Sunset Cliffs, San Diego, California on 16 February 1985. Figure 42 is a drawing of the protoconch of this specimen. It is essentially the same as the protoconch of the juvenile *P. penicillata* shown in Figure 6.

The presence of dots under a thin periostracum is quite evident in Figures 38 and 39. This is characteristic of *Pseudomelatoma sticta*. Also shown in Figures 38 and 39 are the color bands on the body whorl which is evident also in the aperture; this is characteristic of the shell described as *Pleurotoma digna* and is seen in some specimens of *P. sticta*. I consider *P. grippi* a distinct species.

Fig. 38. *P. grippi* (Dall, 1919). Apertural view of specimen from Catalina Island, California

Fig. 39. Dorsal view of specimen shown in Figure 38. Length: 27.2 mm Leg. J. Myers. B. Myers collection

Fig. 40. *P. grippi* (Dall, 1919).
Apertural view of juvenile specimen
Loc. Sunset Cliffs, San Diego, California

Fig. 41. Dorsal view of specimen shown in Figure 40. Length: 5.7 mm
Leg. J. Hertz

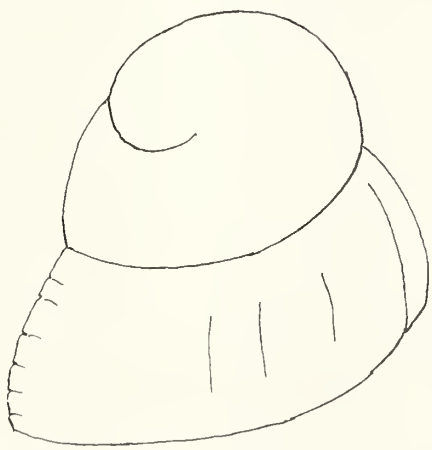

Fig. 42. *P. grippi* (Dall, 1919).
Protoconch of specimen shown in Figures 40 and 41

Pseudomelatoma torosa (Carpenter, 1864)
Figures 43 to 48

Carpenter's (1864:657) original description of *Drillia torosa* was very brief, *i.e.* "whirls rounder, olivaceous: with one row of strong bosses throughout: no posterior knobs." He further described *torosa* in the J. de Conchyliologie (1865b:145) as is reproduced here. The type specimen of *Pseudomelatoma torosa* (USNM 3826) is shown in Figures 43 and 44. The type locality for *P. torosa* is Monterey, California. Figure 45 shows two other specimens of *P. torosa* (SDHNM 22244) from the type locality. Figure 46 shows a growth series of *P. torosa* from Cayucos, California collected by H.N. Lowe in 1925 (SDNHM 22243). The specimens from Cayucos show more distinct spiral cords and subsutural bands.

17. Drillia torosa.

D. t. acuminata, lævi, aurantio-fusca, epidermide aurantio-olivacea induta; anfr. nucleosis ?...(detritis); normalibus 7 tumidioribus, suturis planatis; serie una tuberculorum validorum, subrotundatorum, anfractu penultimo 8, anfr. ultimo haud obsoletis; regione sinus parvi, rotundati paulum excavata; regione suturali haud sculpta; canali longiore; columella recta; labio tenui; labro acuto, postice sinuato. Long. ·95, long. spir. ·55, lat. ·3, poll. : div. 30°.

Hab. Monterey, *Taylor*, *Cooper*.

Cette espèce, ainsi que d'autres *Pleurotomidæ* californiens, appartient à un groupe particulier, dont le *D. inermis*, Hinds, peut être considéré comme le type. Peut-être ces formes seraient-elles mieux placées dans le sous-genre *Clionella*, qui est vraiment marin, d'après les observations du docteur Stimpson sur les espèces du cap de Bonne-Espérance, et non pas Mélanien, comme l'a supposé le docteur Gray, et comme l'ont dit, après lui, MM. Adams et Chenu.

Fig. 43. *Pseudomelatoma torosa* (Carpenter, 1864). Apertural view of type specimen of *Drillia torosa* (Carpenter, 1864). Length: 24.1 mm
Type loc.: Monterey, California

Fig. 44. Dorsal view of specimen shown in Figure 43. (USNM 3826)

Fig. 45. *Pseudomelatoma torosa* (Carpenter, 1864).
Two specimens (SDNHM 22244) from the type locality, Monterey, California.
Length: left spec.: 27.9 mm; right spec.: 27.3 mm

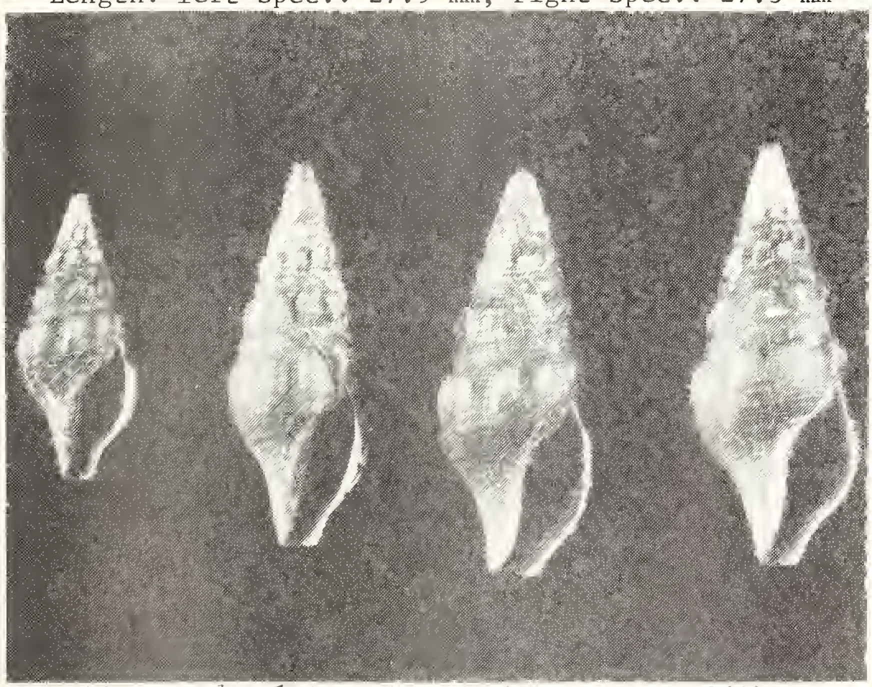

Fig. 46. *Pseudomelatoma torosa* (Carpenter, 1864).
Growth series of *P. torosa* from Cayucos, California (SDNHM 22243) collected by H.N. Lowe.
Lengths: (left to right) 13.1, 17.5, 18.4, 19.3 mm

Grant and Gale (1931:562) gave the following generalized description of *Psuedomelatoma torosa* (Carpenter, 1864).

> Shell of moderate weight and about the size and shape of *moesta* (Carpenter), related to *penicillata* but with the costæ reduced to large, somewhat elongate nodes, about 8 in number, subsutural band much reduced and sometimes absent, whorls sometimes crossed by faint spiral lines, nodes often weak on the body whorl; operculum with a terminal nucleus.
> Dimensions: Altitude, 31 mm.; length of aperture, 12 mm.; diameter of body whorl, 12 mm.

They considered *P. torosa* as possibly a northern variety of *P. penicillata*, primarily because the strong node-like costae and the weak subsutural band give *P. torosa* such a strikingly different appearance. They also considered *Drillia* ?var. *aurantia* Carpenter, 1864 as a variety of *P. torosa*, because it has the same distinct subsutural band and the strong nodes. They noted, however, that the nodes of *aurantia* are sometimes somewhat elongated, more like the costae of *penicillata*.

Carpenter's (1864:657) original description for *Drillia* ?var. *aurantia* was brief as follows: "Orange, with sutural riblet and faint spiral sculpure." Carpenter (1865b:145) described it further as shown here.

> 18. Drillia (?torosa, *var.*) aurantia.
>
> *D. t. • D. torosæ • simili, sed aurantia ; linea suturali expressa; interdum spiraliter sculpta. Long.* ·6, *long. spir.* ·32, *lat.* ·28, *poll.: div.* 38°.
>
> Hab. San Diego, *Cassidy*. — San Pedro, *Cooper*.
>
> Les individus des localités méridionales étaient tous en mauvais état, et je ne suis pas encore convaincu qu'ils appartiennent à la même espèce.

The type of *Pseudomelatoma torosa* variety *aurantia* (Carpenter, 1864) is shown in Figures 47 and 48. The specimen (USNM 15310) is badly beach worn and decollate. The type locality is San Diego, California. Grant and

Fig. 47. *Pseudomelatoma torosa* (Carpenter, 1864). Apertural view of type specimen of *Drillia* ?var. *aurantia* (Carpenter, 1864)(USNM 15310)

Fig. 48. Dorsal view of specimen shown in Figure 46. Length: 15.2 mm Type loc.: San Diego, California

Gale (1931:562) state that living specimens have been found in San Diego. SDNHM 41619 contains 12 specimens collected in San Diego by Dr. Fred Baker and is identified as *P. moesta cf.* var. *aurantia* (originally identified as *P. torosa* var. *aurantia*). The shells appear to be a stubbier lighter color form of *P. penicillata*, have no spiral cords, and very small nodes in the sutural area. The variety *aurantia* appears to be a link between *P. torosa* and *P. penicillata*. I have collected and seen a number of *P. torosa* specimens at Cayucos, California which also have small nodes in the sutural area.

The problem of the *penicillata-torosa* complex therefore appears to be a question of whether we have one continuum (*P. penicillata*) or two distinct species with occasional localized groups of specimens having features of both extremes. In looking at the overall series, we see extremes of sculpture, shape and color forms.

CONCLUSIONS

Based on study of the shell morphology of the *Pseudomelatoma* species from the west coast of Baja California, Mexico and California, U.S.A. and their general distribution, I consider only *P. penicillata, P. grippi, and P. torosa* as distinct species. These species and their synonymies are listed below.

Pseudomelatoma penicillata (Carpenter, 1864)
- *Pseudomelatoma moesta* (Carpenter, 1864)
- *Pseudomelatoma moesta maculata* (Williamson, 1905)
- *Pseudomelatoma sticta* Berry, 1956
- *Pseudomelatoma eburnea* (Carpenter, 1865)
- *Pseudomelatoma digna* (E.A. Smith, 1877)

Pseudomelatoma grippi (Dall, 1919)

Pseudomelatoma torosa (Carpenter, 1864)
- *Pseudomelatoma torosa aurantia* (Carpenter, 1864)

Pseudomelatoma moesta maculata (=*P sticta*) and *P. torosa aurantia* are intermediate links between *P. penicillata* and *P. torosa*, and individual specimens of the intermediate forms sometimes look more like *P. penicillata* while others may look more like *P. torosa*.

Pseudomelatoma penicillata (Carpenter, 1864) has been reported from Buena Vista Beach, south of La Paz, Baja California Sur (SDNHM 45501, 2 specimens) to Monterey, California (*P. moesta* distribution per Dall 1921). Within the overall distribution of *P. penicillata*, the form having "numerous little lines, sometimes diagonal, sometimes zigzagged or interrupted in various ways" has been found from Magdalena Bay, Baja California Sur to San Diego, California.

Psuedomelatoma torosa (Carpenter, 1864) is reported by Dall (1921:70) as distributed from "Monterey, California, to Scammon Lagoon, Lower California." Burch (1946) indicated collecting data from De Poe Bay, Oregon; Crescent City, California; dredged off Monterey in 10-40 fms. (Burch); Monterey and Cayucos (Lowe). All the specimens of *P. torosa* that I have reviewed seemed limited to an area from Long Beach to Monterey, California, and I consider questionable those reported in earlier literature as occurring in Lower California (Baja California Sur).

The distribution for *Pseudomelatoma grippi* (Dall, 1919) is more restricted. Burch (1946(62):10) reported the distribution as Malaga Cove to San Diego, California. He also reported finding *P. grippi* in kelp holdfasts in Santa Monica Bay. McLean (1978:53) notes the distribution as from San Pedro, California, to San Martin Island, Baja California Norte.

Since I consider *Pseudomelatoma eburnea* (Carpenter, 1865) a form of *P. penicillata*, the monotypic subgenus *Laevitectum* Dall, 1919 remains in the synonymy of *Pseudomelatoma* as in McLean in Keen (1971).

ACKNOWLEDGMENTS

I am indebted to the late Joseph Rosewater and Diane M. Bohmhauer of the National Museum of Natural History · Smithsonian Institution, Paul Scott of the Santa Barbara Museum of Natural History and Kathie Way of the British Museum of Natural History for the loan of type specimens. James H. McLean kindly provided the photograph of the type specimen of *Drillia moesta* var. *maculata* Williamson, 1905, and reviewed the manuscript. I am most grateful to David K. Mulliner for all of the other photography and to Anthony D'Attilio for the drawings of the juvenile specimen of *P. penicillata* and the protoconch of *P. grippi*. I am also indebted to Barbara W. Myers for the loan of specimens and Carol Skoglund for allowing me to review her collection.

LITERATURE CITED

BERRY, S. STILLMAN
1956. Malacology.--Mollusca dredged by the Orca off the Santa Barbara Islands, California, in 1951 (communicated by Harald A. Rehder). Jour. Wash. Acad. Sci. 46(5):150-157, 9 figs.
BURCH, J.Q., ed.
1944-1946. Distributional list of the west American marine Mollusca from San Diego, California, to the Polar Sea. [Extracts from the] Min. Conch. Club. S. Calif., Pt. I (Pelecypoda) nos. 33-45 (Mar. 1944-Feb. 1945): Pt. II, nos. I-II (Gastropoda), nos. 46-64 (Mar. 1945-Oct. 1946).
CARPENTER, PHILIP P.
1864: Supplementary report on the present state of our knowledge with regard to the Mollusca of the west coast of North America. Rept. Brit. Assoc. Adv. Sci., for 1863, pp. 517-686 (Aug. 1864).
1865a. Diagnoses of new forms of Mollusca from the west coast of North America first collected by Colonel E. Jewett: Ann. Mag. Nat. Hist., 3d ser., vol. 15:177-182 (Mar.).
1865b. Diagnoses mollusques nouveaux provenant de Californie et faisant partie du Musee de I'Institution Smithsonienne. Jour. Conchyl. 13 (ser. 3, vol. 5) pt. 2:129-149 (Apr. 4).
DALL, WILLIAM HEALEY
1918. Notes on the nomenclature of the mollusks of the family Turritidae. Proc. USNM 54(2238):313-333 (Apr. 5).
1919. Descriptions of new species of mollusks of the family Turritidae from the west coast of America and adjacent regions. Proc. USNM 56(2283): 1-86, pls. 1-24 (Aug. 8).
1921. Summary of marine shellbearing mollusks of the northwest coast of America... Bull. USNM 112, 217 pp., 22 pls. (Feb. 24).
GRANT, U.S., IV and H.R. GALE
1931. Catalogue of the marine Pliocene and Pleistocene Mollusca of California and adjacent regions. Mem. San Diego Soc. Nat. Hist. 1:1-1036, 15 figs., pls. 1-32 (Nov. 3).
HERTZ, CAROLE M.
1984. A preliminary report on *Pseudomelatoma sticta* Berry, 1956 (Turridae: Pseudomelatominae). Festivus 16(7):76-80, 7 figs. (July 12).
HERTZ, JULES and CAROLE M. HERTZ
1984. Survey of mollusks of Punta Asunción and vicinity, Baja California during November 10-14, 1981. Festivus 16(10):98-112, 20 figs. (Oct. 11).
MCLEAN, JAMES H.
1971. A revised classification of the family Turridae, with the proposal of new subfamilies, genera, and subgenera from the eastern Pacific. Veliger 14(1):114-130 (July 1).

1971. in Keen, A. Myra. SEASHELLS OF TROPICAL WEST AMERICA, Second ed. Stanford Univ. Press, Stanford, CA 1064+ pp., [family Turridae, pp.686-766].

1978. MARINE SHELLS OF SOUTHERN CALIFORNIA, Rev. ed., Los Angeles Co. Mus.(N.H.) sci. ser. 24, Zoology, no. 11, 104 pp., 54 figs. (Mar. 20).

MORRISON, JOSEPH P.E.

1966. On the families of Turridae. Ann. Rept. AMU for 1965, pp. 1-2.

POWELL, A.W.A.

1966. The molluscan families Speightiidae and Turridae. Bull. Auckland Inst. & Mus. 5, 184 pp., 23 pls., 179 text figs. (Nov. 1).

SMITH, E.A.

1877. Diagnoses of new species of Pleurotomidae in the British Museum. Ann. Mag. Nat. Hist. 19, ser. 4, no. 49:488-501.

TRYON, GEORGE, W. JR.

1884. MANUAL OF CONCHOLOGY. vol. 6 Conidae, Pleurotomidae. Philadelphia, PA, (Pleurotomidae, pp. 151-413, 34 pls.).

WILLIAMSON, M.B.

1905. Some west American shells - including a new variety of *Corbula luteola* Cpr. and two new varieties of gastropods. Bull. So. Calif. Acad. Sci. 4(8):118-129.

TWO NEW SHELL BOOKS

COQUILLAGES DU GABON SHELLS OF GABON
By Pierre A. Bernard. 1984.
Published by the author, Libreville-Gabon
140 pages (text in French and English) 237 figures, 73 plates
Price: $44.00

This is a very necessary book, well illustrated in color, dealing with the marine Mollusca of Gabon, a country whose coastline extends both north and south of the equator in the wet equatorial zone of Africa. As explained by the author, exploration of this portion of the marine coast of West Africa has proceeded slowly since during the approximately ten month wet season vast amounts of muddy water from the torrential rains are brought by the rivers to the coastal waters. The dry season with clear water is scarcely two months long.

Close to 300 gastropod species are illustrated, some of which are subspecies or forms (form names having no taxonomic value). Most of the species treated are gastropods with only 35 bivalves, 3 scaphopods, and 1 chiton species included. The bilingual text simplifies, for Americans, the understanding of the short diagnostic remarks made for each species illustrated. The clear and beautifully colored plates face the text pages. The species are arranged in alphabetical order within genera (also arranged alphabetically) and systematically by family. Each species has a number to which it is referred on the plates and in the index. The plates, as a result of size constraints, do not always follow the systematic order of the text. This, at times, results in a search for the illustration.

Of particular interest to me was the illustration of *Fusinus caparti* Adam & Knudsen, 1950, a specimen of which was received by the San Diego Natural History Museum from the Morris Levine collection without data and an illustration of *Chicoreus gubbi* (Reeve, 1849), a medium sized species with strong denticles within the aperture whose occurrence at Gabon is an interesting discovery.

It would appear that the avid interest of collectors and their willingness to visit collecting areas such as those in Gabon have made possible the discovery of new species and a wider knowledge of biogeography.

Anthony D'Attilio

SEASHELL TREASURES OF THE CARIBBEAN
By Lesley Sutty. 1986.
Originally published as CENT COQUILLAGES RARES DES ANTILLES. 1984.
Published by E.P. Dutton, NY (American edition)
128 pages (including index) and 139 plates with illustrations in color
Price: $25.95

This is a well written, beautifully illustrated book directed essentially to the collector. The color photography by the author is of very high quality. The book is of aesthetic interest primarily and this is all that the writer claims for it.

The book's title indicates that the Caribbean is covered. The book actually deals with collecting done (obviously with great enthusiasm) in the Lesser Antilles, an area defining the western border of the Caribbean from the Atlantic Ocean. Only one or two species from more distant localities are figured.

In addition to the historical and ecological notes in the species writeups, the chapter, "Science in Shells" from page 111 to 121 is of interest to those collectors wishing to pursue the subject more seriously. Included in this section are a few photographs of ethnographically interesting specimens carved or incised by the Amerindian natives of these islands before the coming of the white man. This section is followed by a bibliography and glossary.

One of the most interesting discoveries, or rediscoveries, by Ms. Sutty is the collecting of two specimens of *Muricanthus strausi* (A.H. Verrill, 1950), one "near a fish trap in 21 feet of water" and the other "crawling on the wooden trap." The species had not been seen since Verrill's report of five specimens from a trap in 75 to 100 fathoms off Dominica Island. Judging from the illustration (p. 56, fig. 7) *Muricanthus strausi* bears some resemblance (though only reaching a size of 2.5 inches) to the northern Gulf of California form of *Muricanthus radix* (Gmelin, 1789) as well as *Muricanthus princeps* (Broderip, 1833). *Muricanthus strausi* Verrill remains a very rare species in collections.

An interesting historical note is that the validity of *M. strausi* and other of Mr. Verrill's species came under a barrage of attacks from several professional workers at the time. The claim was made that publication of new taxa on fragile stencil paper with drawings done on a stencil reproduction sheet did not constitute valid publications. (The papers were published in the Minutes of the Conchological Club of Southern California, the editor of which was John Q. Burch). After much of the ruckus had died down, it became apparent that in the sense of what constitutes publication according to the rules of the International Commission on Zoological Nomenclature, Verrill's work was available. Dr. Emily Vokes, of Tulane University, was one of the first professionals to accept Verrill's names. If there is a problem regarding Verrill's names it is that no information was provided concerning location or depository of his typological material.

Anthony D'Attilio

ANNOUNCEMENT OF A NEW SEASHORE BOOK

Notice has been received of the new book SEASHORE DISCOVERIES by Wesley M. Farmer with over 240 line drawings (by the author) as well as four color plates illustrating 235 species of plants and animals to be found on southern California beaches. The book at $14.95 (plus 6% tax in California) and $2.00 handling is available from the author at P.O. Box 1323, Santee, CA 92071.

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MEMBERSHIP AND SUBSCRIPTION
Annual dues are payable to San Diego Shell Club. Single member: $10.00; Family membership: $12.00 Overseas (surface mail): $12.00 Address all correspondence to the San Diego Shell Club, Inc., c/o 3883 Mt. Blackburn Ave., San Diego, CA 92111 Single copies of this issue: $5.00. Postage is additional.

Meeting date: third Thursday, 7:30 P.M. Room 104, Casa Del Prado, Balboa Park

The Festivus is published monthly except December. The publication date appears on the masthead above.

COME TO THE BAJA PARTY

The annual September party will be held on Saturday September 27 at the home of Barbara and Wesley Farmer. For details see page 134 and the map on the last page of this issue.

There will be no regular meeting this month

CONTENTS

RANGE EXTENSIONS OF FIVE TEREBRID SPECIES

BY

TWILA BRATCHER

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Hastula albula (Menke, 1843) (Figure 1) may be added to the growing list of living Indo-Pacific molluscan species found in waters off the mainland of North America and is the second species of Indo-Pacific terebrid found in the Gulf of California, Mexico. (*Terebra affinis* Gray, 1834, was found living at San Luis Gonzaga Bay about two decades ago by Dorothy Brown). The specimen of *H. albula* was collected live in 12 meters of water on the west side of Isla Santa Catalina, just outside Bahía San Carlos in Sonora, Mexico by Richard J. McClincy of Tucson, Arizona. *H. albula* previously has been reported from the offshore islands of Clarion and Socorro at depths ranging from 7 to 110 meters, but not from the mainland. (Bratcher and Burch 1971).

The species *Terebra corintoensis* Pilsbry & Lowe, 1932, (Figure 2) described from Corinto, Nicaragua, was collected at Cocos Island, Costa Rica by Kirstie Kaiser in 1986. It was dredged at about 135 meters in coarse sand. This is the first report of the species being collected away from the coast of North or Central America.

Fig. 1 *Hastula albula* (Menke, 1843)
Length: 25 mm B. & B. coll. no. 530
Barber's Point, Oahu, Hawaii

Fig. 2 *Terebra corintoensis* Pilsbry & Lowe, 1932
Holotype: ANSP 155281 Length: 13.5 mm
Type. loc.: Corinto, Nicaragua

Two species of *Terebra* described from the Red Sea and thought to be endemic to that area have been found farther south. *T. consobrina* Deshayes, 1857 (Figure 3), was sent to me for identification by Manfred Blocher of West Germany, who reported collecting it at Tulear, Madagascar on sand inside the grand reef. *T. insalli* Bratcher & Burch, 1967 (Figures 4 and 5), has now been found in the Indian Ocean. It was among material sent for identification by Dr. Phillipe Bouchet of the Museum National d'Histoire Naturelle of Paris, France in 1986 and was dredged from deep water off Reunion Island. Specimens of *T. insalli* were collected in the Red Sea by several members of the San Diego Shell Club on a recent expedition.

The known distribution of *Terebra boucheti* Bratcher, 1981 (Figure 6), also has been extended. Formerly known from the Philippines to the Solomon Islands, it was recently collected off South Africa and sent to me by Dr. Kilburn of the Natal Museum.

Fig. 3. *Terebra consobrina* Deshayes, 1857.
Lectotype: British Museum (N.H.)
Length: 89.3 mm. Coll.: Cuming
Type loc.: la mer Rouge (Massau, Red Sea)


Figs. 4 and 5. *Terebra insalli* Bratcher & Burch, 1967. Holotype: CAS 12946
Length: 59.9 mm Type loc.: Gulf of Aqaba
Fig. 5. Detail of holotype

Fig. 6. *Terebra boucheti* Bratcher, 1981.
Length: 47.5 mm
Type loc.: Philippine Is.
[14°16'N; 120°31'E]

Literature Cited

BRATCHER, TWILA

1981. Four previously undescribed Indo-Pacific terebrids. Veliger 23(4):329-332, figs. 1-8.

__________ and ROBERT D. BURCH

1967. A new terebrid species with check list of Terebridae from the Red Sea. Veliger 10(1):7-9, pl. 2.

1971. The Terebridae (Gastropoda) of Clarion, Socorro, Cocos and Galapagos Islands. Proc. Cal. Acad. Sci. 37(21):537-566, 33 figs.

DESHAYES, GEREARD PAUL

1857. Review of *Terebra*. Jour. Conchyl.:65-102, pls. 104-108.

GRAY, J.E.

1834. Enumeration of the genus *Terebra*, with characters of many hitherto undescribed. Zool. Soc. London:59-63.

MENKE, KARL THEODOR

1843. Molluscorum Novae Hollandiae. specimen. A. Hann, Hanover, 46 pp.

PILSBRY, HENRY AGUSTUS and H.N. LOWE

1932. West Mexican and Central American mollusks collected by H.N. Lowe, 1929-1931. Proc. Acad. Nat. Sci. Phila. 84:40-44, pl. 1.

BOOK REVIEW

SEASHORE DISCOVERIES
By Wesley M. Farmer 1986
124 pages, 4 color photographs, 240 line drawings, 1 black and white photograph
Published by Wesley M. Farmer, Santee, California
Price: $14.95

Wesley Farmer's new book functions as a handbook for local, intertidal sealife. A wide range of seashore life is described from algae to birds and mammals. For each animal listed, both common and scientific names as well as range and local distribution are given. The accompanying line drawings are superb and are well suited for field identifications. Observations and anecdotes about natural history are interspersed throughout the book.

The book is arranged in four parts: the main section with identifications and their accompanying line drawings; the second section, a guided nature walk, describes a typical intertidal excursion to one of the local tidepool areas; thirdly a census of animals collected by the public at Bird Rock during a period of six months in 1957; and lastly a listing of living animals by phyla and species.

The guided nature walk gives good information for the beginner on local areas with good tidepooling. Dr. Farmer's idea of stressing conservation in this section and throughout the book has obvious importance in these times. In contrast is the section on the Bird Rock census. Without an effective introduction, the importance of including a 1957 survey in a present-day work is obscured. A possible source of confusion is the inclusion of deep-water species in a "seashore" book. Animals such as *Pandalus*, *Trophon*, and crinoids would not normally be experienced in the near-shore areas.

This is a good handbook and field guide for local tidepoolers who would like to know more about the seashore.

Richard Herrmann

NOTICE OF NEW BOOK: SHELLS OF THE PHILIPPINES by F.J. Springsteen and F.M. Leobrera illustrating over 1600 species in 100 color plates is now available. It will be reviewed in the October issue of The Festivus and is now in the Club library.

COLLECTING AT AND AROUND SAN FELIPE, BAJA CALIFORNIA

BY

FAYE B. HOWARD

Editor's note: The following article written by the late Faye B. Howard (1907-1984) about collecting trips she took in 1957 to the San Felipe area in the northern Gulf of California is published exactly as written. Editorial comments and any updating of taxa according to Keen's 1971 SEA SHELLS OF TROPICAL WEST AMERICA, appear in brackets. It is published through the efforts of F.G. Hochberg, Curator of the Department of Invertebrate Zoology, Santa Barbara Museum of Natural History, who obtained the official release of the manuscript from that institution after the discovery by Joyce Gemmell of the manuscript.

Faye Howard was a staunch supporter of the Santa Barbara Museum of Natural History and left her large and valuable collection and a bequest to the Museum. For more information, see F.G. Hochberg's "In Memoriam" in Shells and Sea Life (Vol. 17(3):99-102).

My only word of advice is DON'T-- that is, if you are not prepared to keep it up. It is a most subtle form of insanity and I am convinced that there is no relief for it except another trip down there.

San Felipe is an accumulation of about 1,000 people at the end of the 125 mile strip of pavement running southeast from Calexico, California. No visitor's permit is necessary for Americans to go as far as San Felipe, and it is a bit tough to go any farther.

This report will skim the cream of five collecting trips at twelve collecting stations. Although not in proper collecting sequence, we will start at the north and work our way southward.

1. There is a turn-off, marked by white painted stones lining a pair of sandy ruts. This is about 18 miles north of the CITY PROPER. At the ocean, a mile or so across the desert, you are at Pelican Point -- I saw pelicans but I couldn't see the point. Here there is space to camp and turn the car around safely. If the Man is there, he asks fifty cents for giving you the privilege of very poor collecting. About a dozen *Calyptraea mamillaris* were taken from the inside of dead *Mulinia* valves. It isn't necessary to turn all the dead valves because the *Calyptraea* raises the roof just a bit and thus betrays her presence. Far out on the sand flat, *Eupleura triquetra* [*E. muriciformis*] was living on a large whale vertebra. A few *Glottidea palmeri* were taken.

2. Almeja Beach, [Playa Blanca (pers. comm. J. Gemmell)] 7 miles north of San Felipe -- more white stones, but this time a printed sign points the way.

There you will find a motel -- rustic cabins -- quite inexpensive -- one dollar a day. These are air-conditioned by a typical Mexican method -- they just omit two of the walls. The carpeting is wall-to-wall sand and red ants. The beach is quite near your quarters - at times. At other times it is a long walk home from a boat ride. Incidentally, Almeja, or freely translated, Clam Beach, was the place we first were exposed to the San Felipe Virus. *Cerithium stercusmuscarum* was our first find. Later he came to be known simply as Joe -- he is to the Gulf as are fleas to two hound dogs - one couldn't have so many! Chances are the first showy shell you find will be a black murex, probably a dead one in a pool -- don't break your back lugging him and all his brothers up the bluff to camp. There are plenty, alive, further out. He is a profitable shell to collect -- a dividend shell, in fact. Frequently you will find him with a *Tivela byronensis*, a *Glottidea palmeri* or a beautiful *Turritella* clutched firmly between his lip and his operculum.

We had many thrills at this beach -- a pure golden *Oliva incrassata* -- a ditto *Pecten circularis* -- while breaking rock for *Lithophaga attenuata* and *abbotti*,

finding four live *Diplothyra curta* in our possession -- racing a rising tide to gather *Neosimnia quaylei* [*Simnia aequalis*] with both hands -- tiny *Seila* anchored to a golden sponge by a thread, swinging free with each wavelet that washed over them -- *Calliostoma palmeri* tumbling in the surf while his cousins *marshalli* and *gemmuloides* were hidden under stones on a rubble beach -- a fine live *Epitonium canna* on top of a stone -- under the same stone *Fusinus dupetithouarsi* depositing their egg capsules.

A group egg-laying bee, staged by a number of *Hanetia pallida* [*Solenosteira pallida*], being raided by a charging *Phyllonotus erythrostomus* was fun to watch -- also the half inch black murex who was firmly convinced that he could dispose of a four and a half inch *Turritella*.

The bullies of the under rock world are the *Octopus fitchi* -- regardless of size, they are quite sure that they can lick anybody on the beach. We measured one of them at 23 inches fighting spread. They are cowardly though. Just because I was collecting one for a bottle job, his buddy sneaked around behind me and bit me.

3. Ensenada Blanca. This beach is about three miles and two bent fenders from Felipe. It is a small bay protected by jumbled grey granite arms. Two species of *Littorina* have a toe-hold on the north arm and *Acmaea* are dominant to the south. Collecting here was rather much the same as at Almeja. Fishing for Córbina here wasn't bad at all -- neither was the fish when fried real crisp! Here it was that my son and I ceased being "shell hunters." After having dozens of real fishermen ask us "Wadja Git?" we promoted ourselves to MARINE BIOLOGISTS. They still asked the question, but on hearing our new answer, showed the proper respect for us.

4. San Felipe. The less said about collecting there the better. Better, I should tell you that there is a good, modern hotel with excellent food and safe water. Prices are the same or perhaps less than the same quality here in California. The manager's wife keeps the beach cleared of shells.

5. Power wagon Beach. [probably near Laguna Percebu (pers. comm. J. Gemmell)] We have a system -- if we can't discover the name of a place -- we give it a name, one we have reason to remember. Hence, power wagon. After considerable dickering and little actual communication, for fifteen dollars we chartered the monster. It, along with its mahout, would be at the hotel at ten o'clock sharp. We figured that eleven was pretty good -- in fact better than we expected.

The tires may have had some tread in the past, but this was the present. Because I wasn't quite the oldest member of the party, I didn't qualify for the seat beside the driver. Perhaps it's just as well at that. She acquired a beauty of a bruise that just perhaps could have been inflicted by one of the many springs that leered through the upholstery. I had place of honor on the splinter and bolts adjacent to a dancing five gallon can of water -- our water was "just in case."

We proceeded through all the gears, through the desert -- on the old road because it was better than the new -- past a large stand of saguaro -- until two hours and twenty miles later we were on a fine beach with good sand flats and a few likely rock reefs. Here we found our first *Cypraea* -- dead, but an indication. The dominant shell was *Oliva incrassata*, but there were many things. Something had killed *Solen rosaceus* and *mexicanus*. They were on the beach by the thousands. They were in perfect condition and more were coming in on every wave. Especially fine *Olivella dama* were taken along with *Polinices uber*, *Donax navicula* and *gracilis*, *Cardium elatum* and *procerum*, *Heterodonax bimaculatum* [*H. pacificus*], *Glycymeris maculata*, and *Nassarius iodes* and *leucops*.

The back beach yielded large valves of *Panope* [*Panopea*] *globosa* and *Dosinia ponderosa*. Also *Ficus decussata* [*F. ventricosa*], *Arca pacifica* and *Calliostoma eximium*.

We couldn't work until full ebb tide because Umberto insisted that he must get his monster back to San Felipe before dark.

6. Skiff Beach. On April 17, 1957, we wanted to try Power wagon again, but Umberto was down with a bad case of "having been to Mexicali." Consequently, we went bargaining for a boat. We were doubtful that the skiff we started out in could

get in over her draw without sinking, but persistent bailing won out over the leakage. We never did find the beach we were seeking. The skipper took us south until, about two hours later, we ran aground on a sand bar. Noting his beautiful shrug, we decided that we had another beach to name. [There is a big sandbar between Radar Beach and Alicia Playa (pers. comm. J. Gemmell)]

Right after wading ashore my son found an eleven inch *Atrina tuberculosa* by kicking what he thought was a rock sticking out of the sand. I found a medium sized *Pinna rugosa* among some rocks. I put it in the skiff to lighten my load and it was stolen by a hungry pelican.

If we had ever been told that the day would come that we wouldn't pick up a fine live *Oliva* unless it was the exact color desired, or that *Polinices bifasciatus* must be over an inch in diameter....! The beach was simply swarming with them. *Conus regularis* and *ximines* were abundant. *Solen rosaceus* were popping out of the sand. Observed one jump and land eight inches from his burrow.

Found one *Calyptraea mamillaris* living on a dead "arrowhead" sand dollar. Large *Glycymeris maculata* were plentiful as were *Natica marochiensis* [*Natica chemnitzii*].

We collected until the tide turned and then skiffed back to headquarters through a rough sea. Up to this point we have classified over two hundred species and still have a few puzzles to figure out.

One thing that we have noted -- there is a difference in the population each month on the beach. The first tide in December -- the most noticeable were the black murex -- *Phyllonotus* [*Muricanthus*] *nigritus*. The second tide in December *Acanthina angelica* was the dominant shell.

The *Fusinus* and *Neosimnia* [*Simnia*] were in closer than usual in March, but the *Turritella* were practically obnoxious because they interfered with other collecting. They were in the tide pools, on rocks and out on the sand flats making trails like olives and cones. By the time of the April tides, they had been almost completely replaced by the *Polinices*, cones and olives. The last being found two to the trail. Oddly enough, they were usually found a light and a dark color together. This would seem to indicate that color variation is a sex-linked characteristic.

About the first of May, Mrs. Vazquez, wife of the manager of the hotel in San Felipe, decided to celebrate her birthday with a cruise to the Enchanted Islands. These small islands -- or large rocks -- are about one hundred miles south of San Felipe. The fact that it was raining in no way dampened our excitement. Sunday, May 12, found us lined up for our dramamine pills and a briefing by Mr. Vazquez. His 40-foot cruiser, the Pompano, was ready if we were. The crew of three were subjected to a snide bit of bantering from friends on the beach --poor crew -- saddled with four middle-aged matrons. We sailed about six P.M. in a very choppy sea. Eight hours later I awakened to the sound of the anchor chain running out and to a bit of puzzlement to find myself asleep on what seemed to be the top shelf of the kitchen cupboard. Our anchorage proved to be:

7. Puertacita. [Puertecitos] We were out early for collecting and found good rocky reefs and fine sand flats. In addition to practically all the varieties we had found further north, we took *Terebra variegata, Cancellaria sp., Acmaea* [*Colisella*] *dalliana, Solarium sp., and Potamides sp.*

When the tide turned, we got under way to our next stop. On the way we divided our time between the galley, where we were learning the hard way, and the deck, where the scenery was magnificent. We were passing among the Enchanted Islands. They looked like something out of fairy land. Some dark, some almost white from the guano of the thousands of birds nesting there, and some a combination of lava and pumice. After four hours we entered a beautiful land-locked harbor -- the safest port in the whole Gulf of California.

8. Bahia San Luis Gonzaga. During the afternoon we went ashore to explore a bit and to see what the drift might promise for the next morning's low tide. At the back of the bay we discovered some large Indian middens. Apparently they had never been disturbed because we were able to find many pairs of the various bivalves

in the heaps. Another thing we found there was what we assumed was a grave. On it was a three-foot design made of shells -- *Arca* and *Strombus gracilior* mostly. It required very little imagination to see a large sting ray depicted.

There was a full moon that night, and about midnight the big mantas were around our boat. They were having a great time -- leaping out of the water and then flopping down with a sound like a gun shot.

Next morning we were up and about early for the tide. It was heart-breaking. We had only one tide to work, and the decisions whether to stay in the rubble rock and pick cypraeas, marginellas and arcas -- to go around to a sandy bar and gather cones by the gallon -- to go to the north side of the bay and take the large *Cardium elatum* as they erupted from the sand -- or go out in the middle of the flats and gather pink and black murex of the finest quality. It was the richest collecting we have ever seen.

Mr. Vazquez had thoughtfully provided the hold with plenty of ice so that we didn't have to spend all our time between low tides working. We went on that afternoon for another hour to the southernmost point of the cruise to --

9. San Francisquito Bay. [probably the cove just north of Punta Final (pers. comm. J. Gemmell)] This gem of a harbor is completely hidden. We were sailing directly toward some rugged mountains -- made a left turn and entered a beautiful M-shaped cove. The center of the M was a rugged, rocky crag --covered with elephant trees. It was a wonder that they could get a foot-hold at all, so scanty was the soil. We couldn't wait to get ashore to snoop. The three-man crew landed us in a beautiful tiny cove and then they took the dinghy and went fishing. The temptation to go for a swim was too much for a couple of the ladies. It was a very short dip, however, because a couple of triangular fins came along.

Almost at dusk, we found *Acmaea dalliana* in great abundance. Early next morning we went back to the same place and could find none at all. They certainly are nocturnal in habit. (At Punta Penasco we observed them disappearing at daybreak.) We had good collecting of many species -- a new (to us) olive -- a form of *Olivella dama* that was almost black -- many familiar species but also many that as yet we haven't had time to work out.

10. Las Cruces. From San Francisquito we turned toward home. First stop was the tiny island Las Cruces -- just so we could say that we had stepped on the Enchanted Isles. It is composed of lava and pumice and there was no thought of collecting anything; however, I found a stone with a crude face chiseled on it. It didn't appear to have been a local stone. [Probably off Willard Island since the Enchanted Isles are north of Willard Point (pers. comm. J. Gemmell)]. We sailed on until in the outer entrance to San Luis Gonaga. Instead of entering, we anchored in the shelter of the tip of the north arm of the bay. This Point is --

11. Willard Point Where we landed we found pieces of what must have been the largest *Strombus galeatus* ever grown. But, it was flood tide so we had no chance to look for them living. The skipper told us that there was no danger of side-winders around there. We climbed to the top of the ridge of the point, and there we found two lonely graves. They were packed with stones to ward off coyotes and decorated with strombus shells and with a tiny cross at the head. On the north side of the point, at full tide, we collected at 70 species within two hours. We also cut trails of six side-winders -- either that or else the trail of one very well traveled one. Back on the Pompano, we went on to Puertacita for the night. There was no thought of collecting there the next morning so we moved on northward to a point --

12. Thirty Miles Out (of San Felipe). We went ashore and worked about an hour. Small amount of loot included three dozen live *Marginella*, two dozen live *Corbula* and two fine yellow *Pleurotoma*.

Back in San Felipe Harbor, Mrs. Vazquez planned a ruse to save our equipment and shells from the usual rough handling given any gear by the small beach "Red Caps." She explained to our skipper that I was a famous Conchologist, that I wrote books on the subject, and that our things <u>must</u> be handled with the greatest of care. They were!

Our host of the Port was a young gentleman about seven years old. He was dressed in a suit that exactly matched his complexion. As a matter of fact it was his complexion.

At the hotel we set up a shell cleanery. The chef begged the large murex carcasses from us and for our luncheon, surved a murex chowder. It was peppery and it was good. The murex tastes very much like scallops but is sweeter. We were told that once one eats the murex he will surely return to the Gulf. Isn't that a terrible fate?

CLUB NEWS

FROM THE MINUTES - SAN DIEGO SHELL CLUB MEETING - AUGUST 21, 1986

The meeting was called to order by president Richard Herrmann at 7:35 P.M. There was one guest present, Suzanne Mathews.

Richard announced the Underwater Film Festival on September 5 and 6 with Club members Ron McPeak, Bob Yin and Richard Herrmann participating on the first evening.

The annual September party was discussed (see below and map last page), and it was announced that the October meeting will feature a program by Jerry Allen on Diving in Thailand.

The program for the evening was presented by George Hanselman. He showed some exquisite slides of chitons explaining the patterns and structure of them. Members received a learning experience about chitons without even realizing it. He also shared with the members his method of keeping the collected chitons flat and flexible. It was a program greatly appreciated by all in attendance.

The shell drawing was won by Bill Romer.

Barbara W. Farmer

COME TO THE BAJA PARTY

The Club's annual September party with a Baja theme will be held at the home of Barbara and Wesley Farmer on September 27 beginning at 6P.M. (See map last page).

Come in your Baja Best attire and join your friends for a great fiesta!! Besides the terrific Mexican delicacies there will be music and dancing from south of the border and a pinata filled with shell goodies. If you have not been contacted and need information call either Richard Herrmann (459-3317); Carole Hertz (277-6259); or Ian Hamilton (278-6213).

Don't miss the fun. Come to the fiesta!!

A REPORT ON THE CONCHOLOGISTS OF AMERICA CONVENTION

The 14th annual convention of the Conchologists of America (COA) was held at the Sheraton Yankee Trader Hotel in Ft. Lauderdale, Florida July 15th through 19th. Of the 687 members, about 250 attended the convention. The programs were on both popular and scientific subjects. Among them were presentations on shelling trips, rare shells, molluscan egg masses, and chemical communication in mollusks.

Although summer is the rainy season there, we had perfect weather, which enabled us also to have a fine beach breakfast followed by a treasure hunt. Before the convention members arrived, the Broward Shell Club had "salted" the beach with numbered shells for prizes. A New York tourist arrived at the beach and began finding a wealth of unusually beautiful shells. When one of the club members explained the situation to her, she not only returned the shells but policed the area to keep other beach walkers from picking them up. She seemed delighted with an invitation to breakfast, and most of us gave her the shells we had picked up. Best shelling day she ever had.

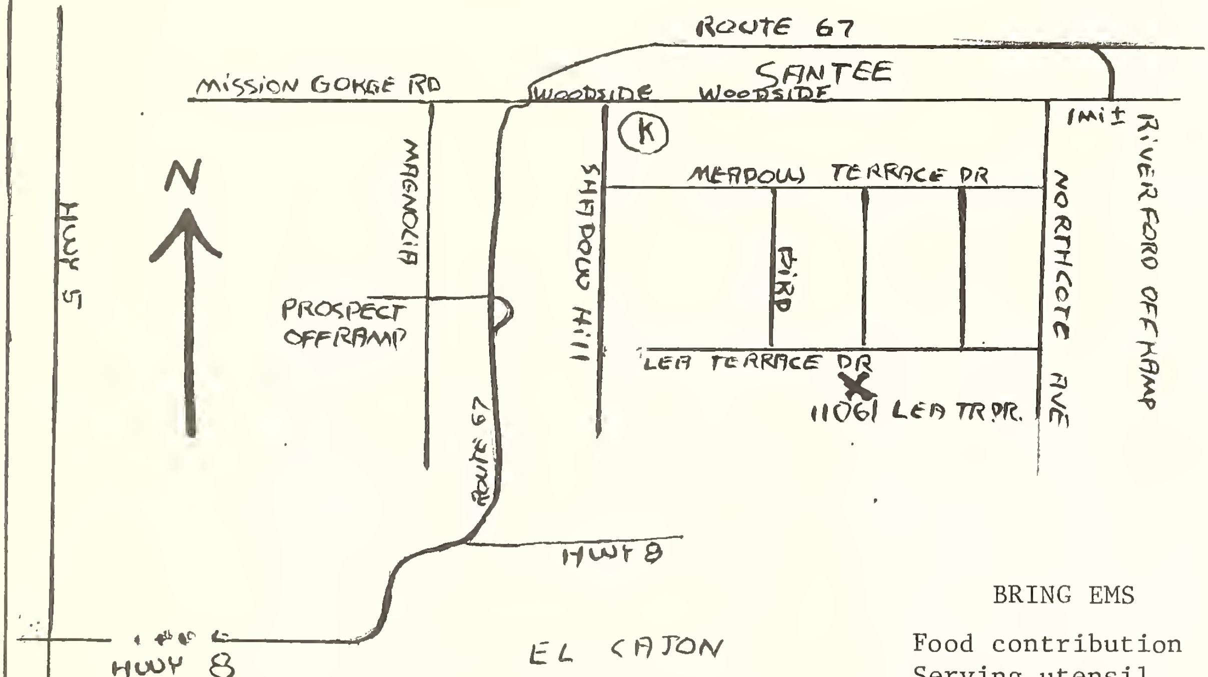
Friday evening and Saturday morning were devoted to the dealers' bourse with an opportunity to admire or buy all kinds of beautiful shells and shell related objects.

Dr. Clyde Roper was the banquet speaker, giving a talk on giant squid, a fine finish to a fine convention.

Billee Dilworth Brown

BAJA PARTY

Saturday September 27, 1986
6:00 P.M. - ??
Home of Barbara and Wes Farmer



BRING EMS

Food contribution
Serving utensil
Eating utensils

Take Hiway 8 E to 67 N
67 N to Prospect offramp
R turn onto Magnolia. Take Magnolia
to Mission Gorge. R on Mission Gorge.
Bear R, Go under Fwy. (Becomes Woodside).
Turn R at Shadow Hill. You'll see K.
Shadow Hill to Meadow Terr. Turn L
Meadow Terr. to Bird. Turn R on Bird.
Bird to Lea Terrace. L onto Lea Terrace Dr.
11061 Lea Terrace Dr. Phone: 448 8697

Come in your Baja best!! There will be music, entertainment, the pinata and great food and terrific Baja buddies!!!

THE FESTIVUS

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MEMBERSHIP AND SUBSCRIPTION

Annual dues are payable to San Diego Shell Club. Single member: $10.00; Family membership: $12.00 Overseas (surface mail): $12.00 Address all correspondence to the San Diego Shell Club, Inc., c/o 3883 Mt. Blackburn Ave., San Diego, CA 92111 Single copies of this issue: $5.00. Postage is additional.

Meeting date: third Thursday, 7:30 P.M. Room 104, Casa Del Prado, Balboa Park

The Festivus is published monthly except December. The publication date appears on the masthead above.

PROGRAM

Underwater in the Philippines

Jerry Allen and Mike Miller, prominent underwater photographers active in the Underwater Photographic Society, will share some of their beautiful slides taken in Philippine waters, many highlighting the nudibranchs of the area.

Meeting date: October 16

CONTENTS

NOTES ON GENERIC CHARACTERS

BY

ANTHONY D'ATTILIO and BARBARA W. MYERS

Department of Marine Invertebrates, San Diego Natural History Museum, Balboa Park, P.O. Box 1390, San Diego, California 92112

Genera as we all know are human inventions, that is, concepts to categorize species into groups closely related to each other. Taxonomic characters, besides the general morphology of the shell, include protoconch, ontogeny of the earliest postnuclear whorls, radula, and opercular characters. Species other than the generic type are, or have been, shifted from one genus to another since the time of Linne, 1758, as more emphasis is placed subjectively by authors on one or the other of the foregoing characters.

The problems of systematics do not stop at the genus level, but may reach both the subfamily as well as the family level. The creation of the subfamily, Muricopsinae, by Radwin and D'Attilio (1971), is an example. The genera moved to Muricopsinae were withdrawn mostly from the Muricinae. This came as a result of differences in the overall morphology of all characters, but primarily that of the radula.

A few examples of the above problems at the generic level are given here:

1. *Muricopsis blainvillei* (Payraudeau, 1826) (Figure 1), the type of *Muricopsis* Bucquoy & Dautzenberg, 1882, is a non-spinose Mediterranean species, although occasionally some spinosity is present on the leading edge of the varix. This is in marked contrast to the well developed moderately long spines of *M. armatus* (A. Adams, 1854) and *M. jaliscoensis* Radwin & D'Attilio, 1970. *M. blainvillei* has a simple rounded protoconch (Figure 2) while the protoconchs of *M. armatus* and *M. jaliscoensis* (Figure 3) are tabulate. However, in Myers & D'Attilio (1986) species referred to *Muricopsis* have tabulate as well as rounded protoconchs. The radulae of both *M. blainvillei* (Figure 4) and *M. jaliscoensis* (Figure 5) are similar in their muricopsine characters.

2. *Favartia brevicula* (Sowerby, 1834), the type of *Favartia* Jousseaume, 1880, is very distinctive having coarse, thick, rounded varices with squarish pits. Nonetheless, moderately spinose species such as *F. judithae* D'Attilio & Bertsch, 1980 (Figure 6), have been placed recently in *Favartia*. Ponder (1972) submerged *Murexiella* Clench & Perez-Farfante, 1945, as a subgenus of *Favartia*. The type of *Murexiella* is *M. hidalgoi* (Crosse, 1869) (Figure 7) a species with thin blade-like varices and foliaceus spines. The radula of both *Favartia* and *Murexiella* are both muricopsine.

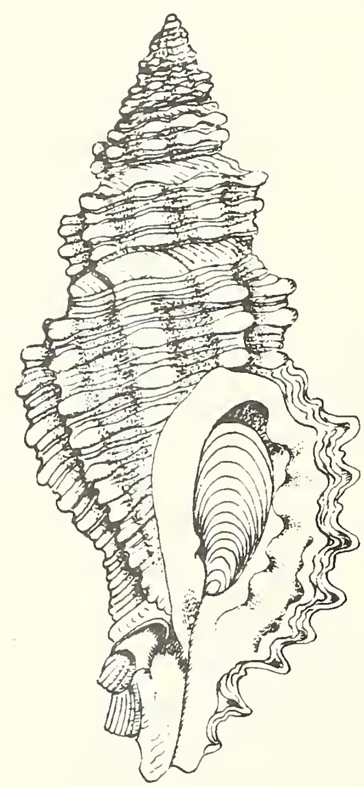

Fig. 1 *Muricopsis blainvillei* (Payraudeau, 1826), apertural view (SDNHM 78031). Sicily. Size: 25 x10.7 mm

3. There are two morphologically distinct groups comprising *Homalocantha* (Mörch, 1852), *H. scorpio*

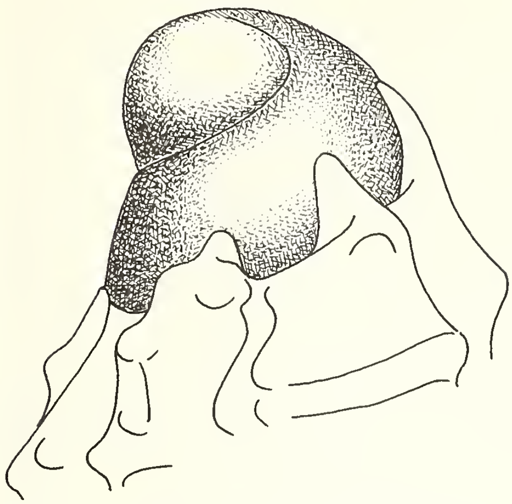

Fig. 2 Camera lucida drawing of the protoconch of *M. blainvillei*

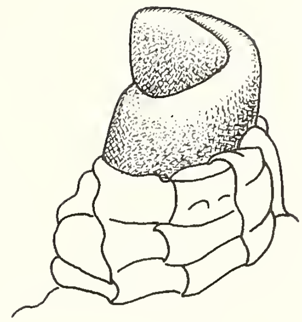

Fig. 3. Camera lucida drawing of the protoconch of *M. jaliscoensis*

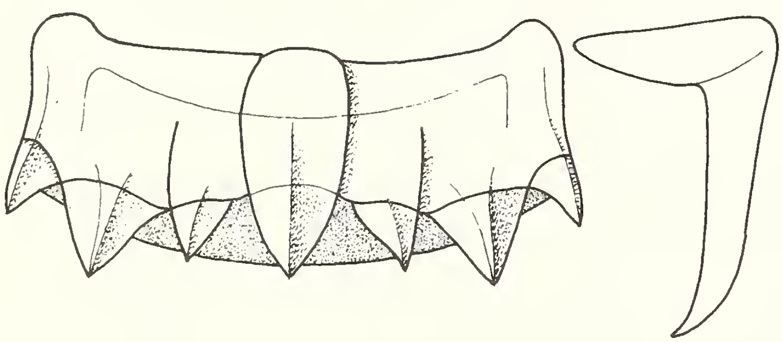

Fig. 4. Camera lucida drawing of the radula of *M. blainvillei*

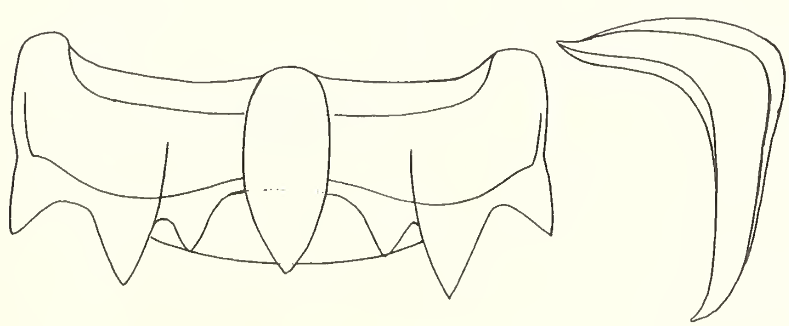

Fig. 5 Camera lucida drawing of the radula of *M. jaliscoensis*

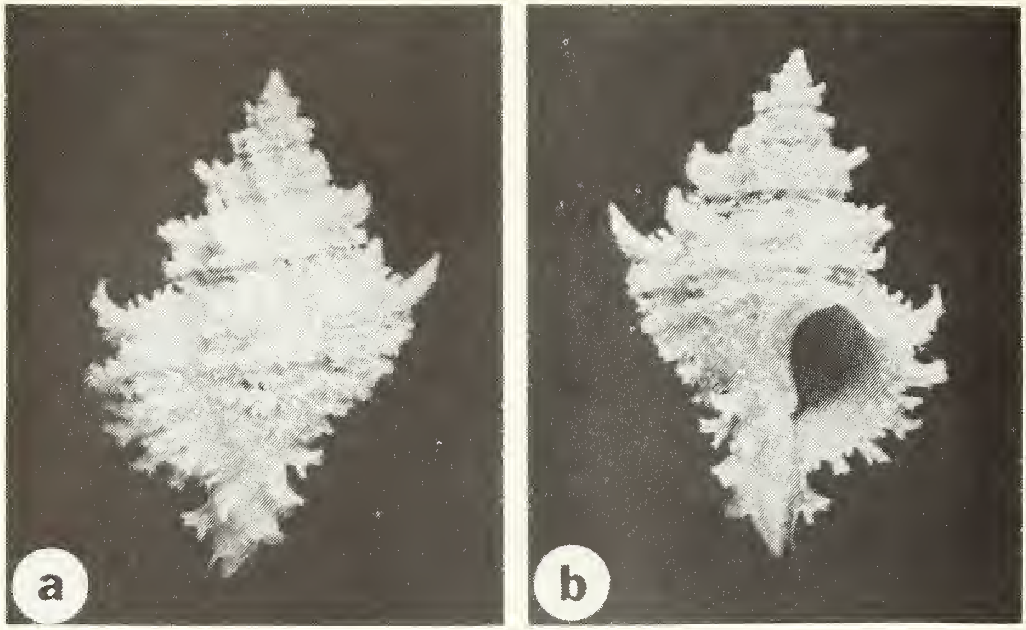

Fig. 6 *Favartia judithae* D'Attilio & Bertsch, 1980, dorsal and apertural views of holotype (SDNHM 88143 [T.S. 521]). Length: 25 mm From D'Attilio & Bertsch (1980)

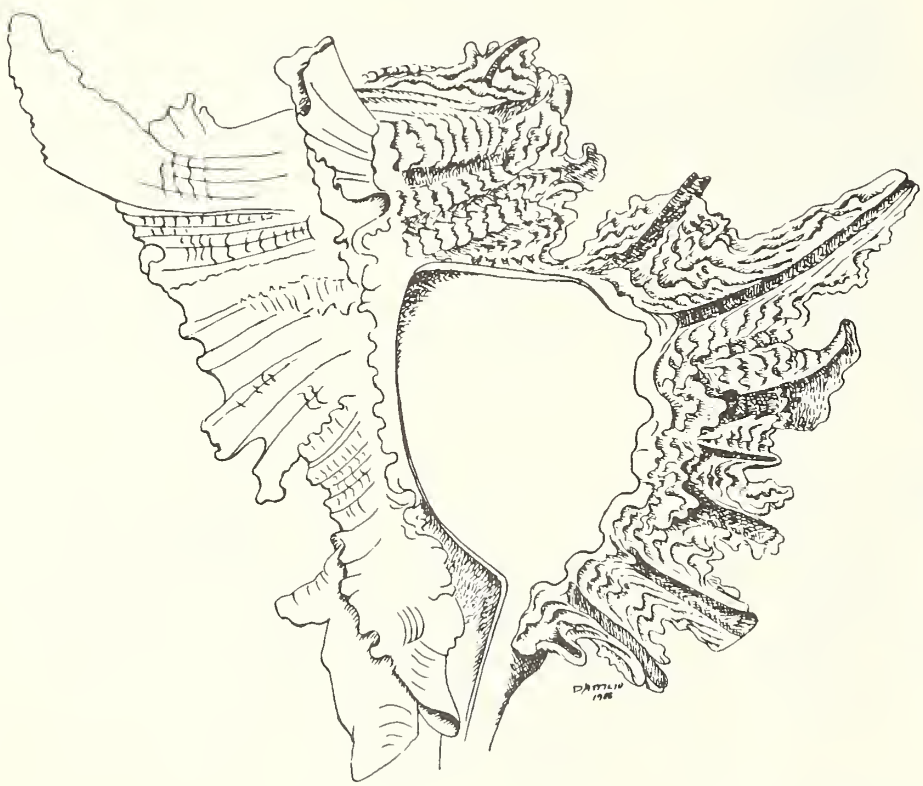

Fig. 7 *Favartia (Murexiella) hidalgoi* (Crosse, 1869) SDNHM 80990. Detail drawing of apertural varix. Size: 22.4 x 16.9 mm

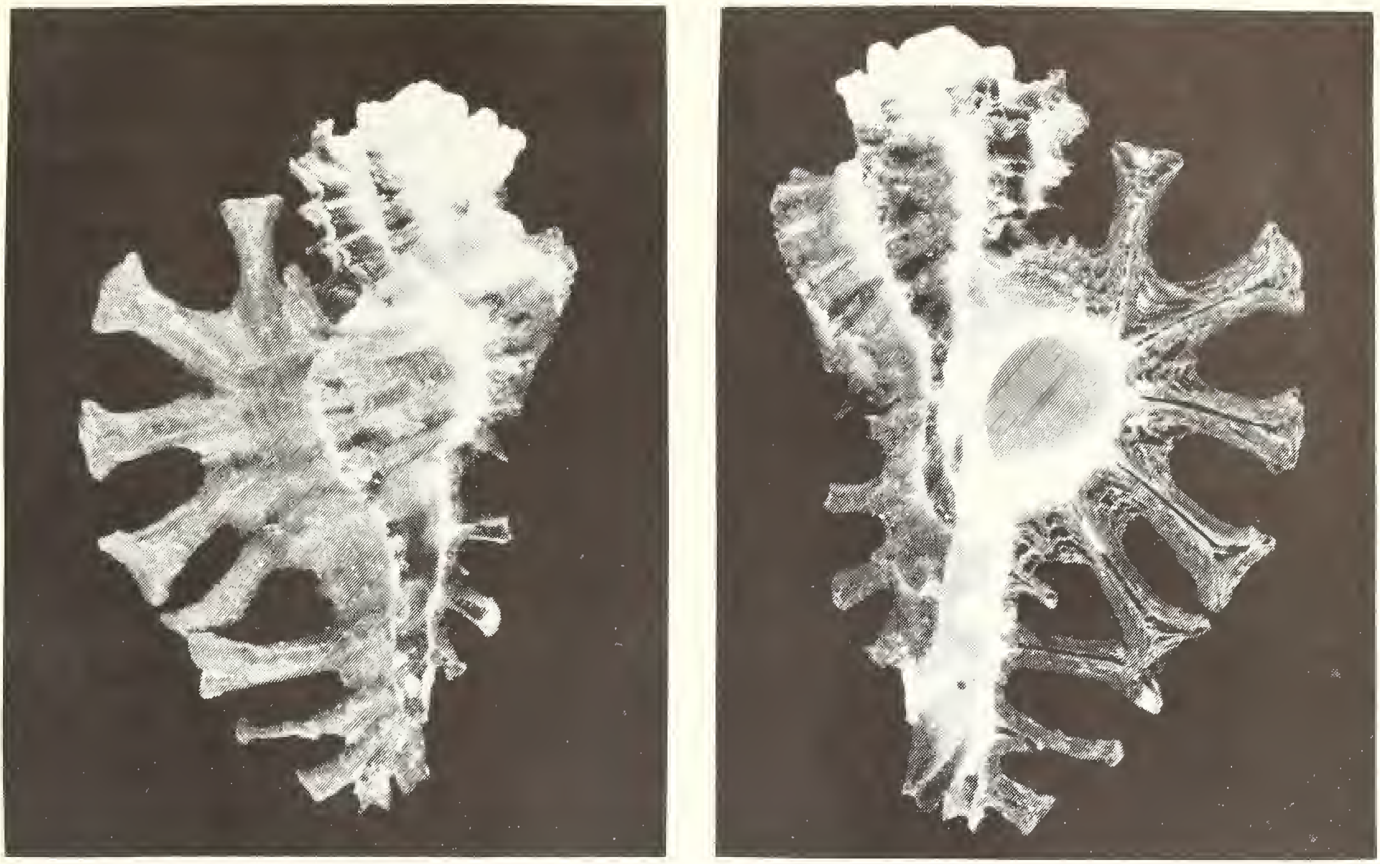

Fig. 8 *Homalocantha scorpio* (Linne, 1758); type of *Homalocantha*. SDNHM 50825
Dorsal and apertural views. Size: 40.7 x 26.8 mm. Philippine Islands

(Linne, 1758), type of the genus (Figure 8): *H. secunda* (Lamarck, 1822); *H. anatomica* (Perry, 1811); *H. pele* (Pilsbry, 1918); *H. zamboi* (Burch & Burch, 1960); *H. lamberti* (Poirier, 1883); *H. anomaliae* (Kosuge, 1979); *H. dovpeledi* (Houart, 1982); and possibly others in one group all with broad spines terminating in palmate digitations. *H. melanomathos* (Gmelin, 1791); *H. oxyacantha* (Broderip, 1833) (Figure 9); and *H. tortua* (Sowerby, 1834) are in the other group with spike-like spines. Dr. Emily Vokes (1971) properly diagnosed the generic affinities when she changed *Muricanthus oxyacantha* to the genus *Homalocantha*. The radula of *H. oxyacantha* (Figure 10) and that of *H. scorpio* (Figure 11) are very similar. Further radular studies of other *Homalocantha* species of both groups, those having spike-like spines and those having broad spines with terminally palmate digitations, have confirmed the radular relationship which is almost uncannily the same for all species studied. On the other hand, the protoconchs differ to a great extent, as shown in Myers & D'Attilio (1986).

4. *Coralliophila incompta* Berry, 1960 [= *Attiliosa nodulosa* (A. Adams, 1855)], the type of *Attiliosa* Emerson, 1968, is another example of generic inconsistency. The lirae in the apertures of *A. nodulosa* (Figure 12) and *A. philippiana* (Dall, 1889), are replaced by well developed denticles in *A. nodulifera* (Sowerby, 1841) and *A. caledonica* (Jousseaume, 1881) (Figure 13). See Vokes & D'Attilio (1982) for illustrations of *A. nodulifera*. The radulae of these species are similar.

5. One other example is that of *Murex planiliratus* Reeve, 1845 [= *M. fimbriatus* Lamarck, 1822], a small muricid from southwest Australia (Figure 14). It was assigned to the genus *Muricopsis* Bucquoy & Dautzenberg, 1882, by Ponder (1972:240, pl. 22, fig. 9, text fig. 3, no. 27) who also worked out the synonymy for this species.

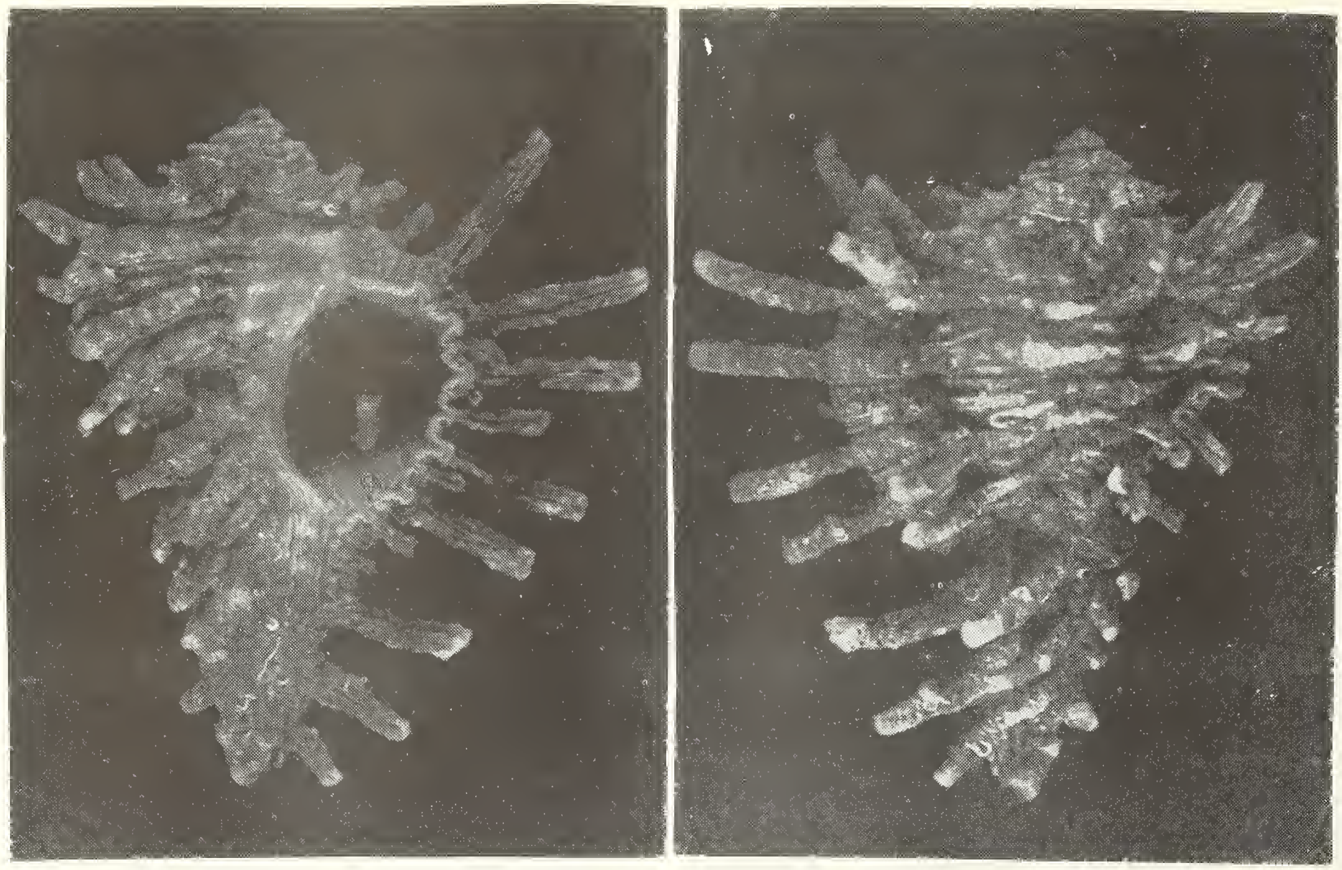

Fig. 9 *Homalocantha oxyacantha* (Broderip, 1833), apertural and dorsal views. SDNHM 81654. Size: 30 x 27 mm. Bahía Coastecomate, Jalisco, Mexico From D'Attilio (1983).

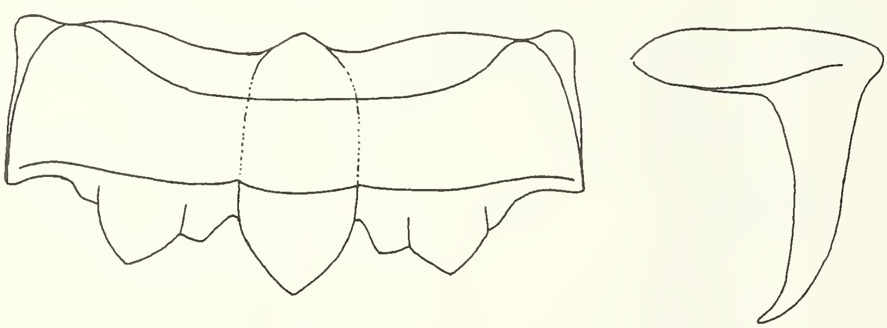

Fig. 10 Camera lucida drawing of the radula of *H. oxyacantha* SDNHM 81654

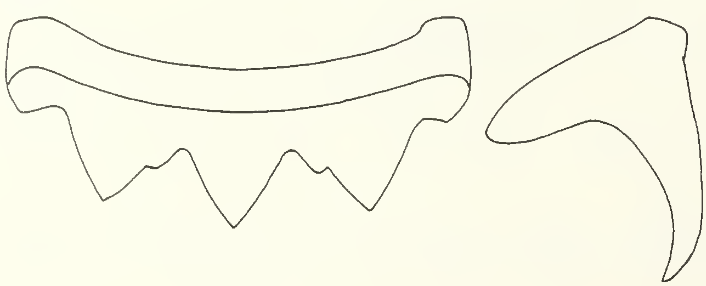

Fig. 11 Camera lucida drawing of the radula of *H. scorpio* SDNHM 78301

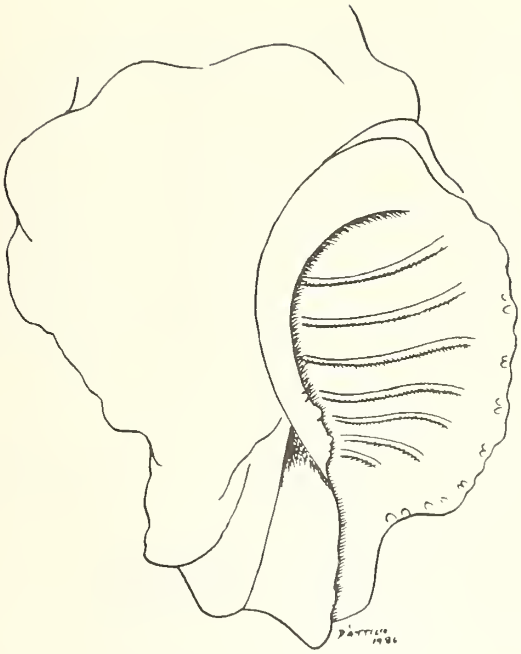

Fig. 12 *Attiliosa nodulosa* (A. Adams, 1855) SDNHM 82988. Detail of aperture.
Size: 31.5 x 19 mm; Guaymas, Sonora, Mexico

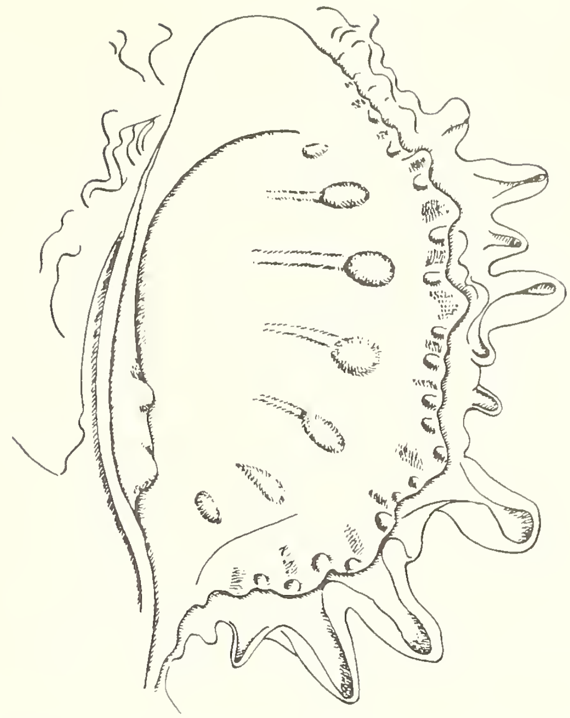

Fig. 13 *Attiliosa caledonica* (Jousseaume, 1881). SDNHM 87067. Detail of aperture.
Size: 30.5 x 17.5 mm; Kwajalein Island

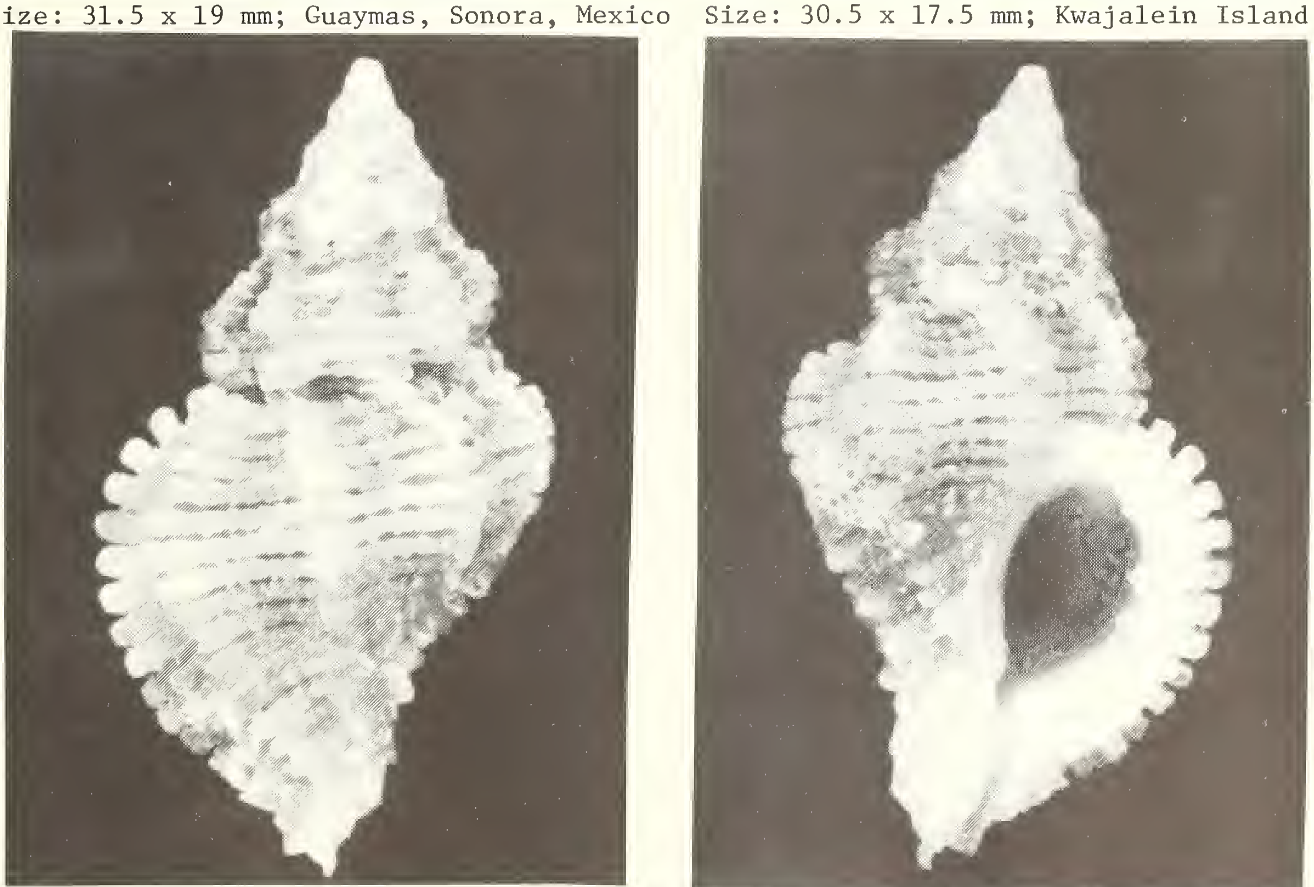

Fig. 14 *Murex planiliratus* Reeve, 1845, dorsal and apertural views of a specimen from Woodman's Point, West Australia in the Emily Vokes collection.

The basis for his assignment was the tabulate protoconch (Figure 15), and its muricopsine radula. However, he noted at the time that the surface sculpture of this species consists of minute scales on the spiral cords not otherwise noted in *Muricopsis*. Under magnification these scales on the spiral cords are wider than the cords, extending beyond the cords on each side (Figure 16). The interspaces between the cords are deep channels and the laminae are so subdued in these interspaces as to appear absent. Radwin and D'Attilio (1976) assigned *M. planilirata* to *Favartia*, which has scabrous lamellae on the cords. *M. planilirata* has a dentate aperture, while in *Favartia* the aperture is lirate. It is our opinion that this species with its numerous spiral cords, sharply edged varices, and dentate aperture most probably belongs in *Pygmaepterys*.

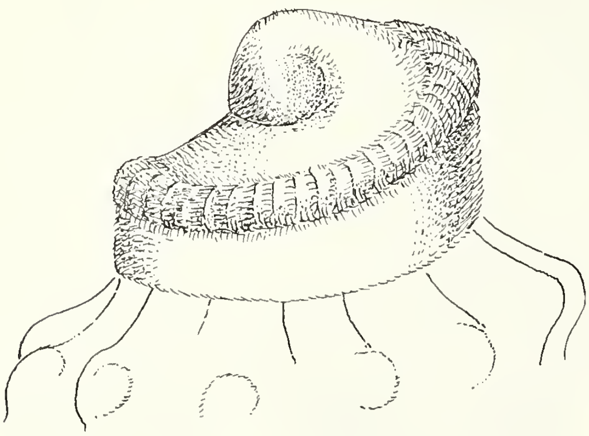

Fig. 15 *M. planiliratus* SDNHM 61857, from West Australia. Camera lucida drawing of protoconch at 50X

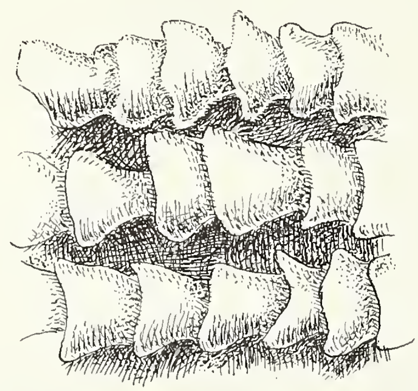

Fig. 16 *M. planiliratus* SDNHM 61857, Camera lucida drawing of spiral sculpture at 12X

Systematics at its best then is a subjective science and there will always be species that don't fit the parameters outlined by human logic, resulting in mismatching of sculpture, aperture, varix, protoconch, etc.

ACKNOWLEDGMENTS

We wish to thank Dr. Emily Vokes of Tulane University, New Orleans, LA, and also Messrs. Charles Glass and Robert Foster of Santa Barbara, CA for loan of specimens of *Murex planiliratus*. We also thank Mr. David K. Mulliner for his photographs of *Homalocantha scorpio*, *H. oxyacantha* and *Murex planiliratus*. We are grateful to Dr. Hans Bertsch for his photographs of *Favartia judithae*. We appreciate Mrs. Theo Fusby's careful typing of the manuscript.

LITERATURE CITED

ADAMS, A.

1854. Description of new shells from the collection of H. Cuming, Esq. Proc. Zool. Soc. London for 1853. pp. 69-74.

1855. Description of twenty-seven new species of shells from the collection of H. Cuming, Esq. Proc. Zool. Soc. London for 1854. pp. 311-317.

BERRY, S.S.

1960. Notices of new eastern Pacific Mollusca IV. Leaf. in Malac. 1(19):115-122.

BRODERIP, W.J.

1833. Characters of new species of Mollusca and Conchifera collected by Mr. Cuming. Proc. Comm. Sci. Corres. Zool. Soc. London for 1832. pp. 173-179

BUCQUOY, E. and P. DAUTZENBERG
1882. In Bucquoy, Dautzenberg and Dollfus. Mollusques marins du Roussillon. Bailliere, Paris. Vol. 1, 570 pp.
BURCH, J.Q. and R. BURCH
1960. Notes on the subgenus *Homalocantha* Mörch, 1852, with description of a new subspecies. Hawaiian Shell News 8(5):2,7.
CLENCH, W.J. and I. PEREZ-FARFANTE
1945. The genus *Murex* in the western Atlantic. Johnsonia 1(17):56, 28 pls.
CROSSE, H.
1869. Diagnoses molluscorum novorum. J. de Conchyl. 17:408-410.
DALL, W.H.
1889. Reports on the results of dredging ...by the U.S. coast survey steamer "Blake"...XXIX. Report on the Mollusca Pt. 2... Bull. Mus. Comp. Zool. 18, 492 pp., pls. 10-40.
D'ATTILIO, A.
1983. Microscopic examination of the surface sculpture, protoconch, and operculum of *Homalocantha oxyacantha* (Broderip, 1833). Festivus 15(9): 92-93, 5 figs.
________ and H. BERTSCH
1980. Four species of *Pterynotus* and *Favartia* (Mollusca: Gastropoda: Muricidae) from the Philippine Islands. Trans. S.D. Soc. Nat. Hist. 19(12):169-179.
EMERSON, W.K.
1968. Taxonomic placement of *Coralliophila incompta* Berry, 1960, with the proposal of a new genus *Attiliosa* (Gastropoda: Muricacea). Veliger 10(4): 379-381, pl. 53.
GMELIN, J.F.
1791. Linnaeus systema naturae ed. 13. Aucta reformata. Lipsiae Vol. 1, Pt. 6, #325 *Murex* pp. 3525-3565.
HOUART, R.
1982. Description et illustration d'une nouvelle espece de Mer Rouge: *Homalocantha dovpeledi* sp. nov. (Gastropoda: Muricidae: Muricinae). Informations Soc. Belge de Malac. ser. 10(1-4):77-80.
JOUSSEAUME, F.
1880. Division methodique de la famille des Purpurides. Le Naturaliste 42: 335-336.
1881. Diagnoses de mollusques nouveus. Le Naturaliste Annee 3(44):349-350.
KOSUGE, S.
1979. Description of two new species of the family Muricidae (Gastropoda, Mollusca). Bull Inst. Malac. Tokyo 1(1):1-2, pl. 1.
LAMARCK, J.B.P.A.
1822. Histoire naturelle des animaux sans vertebres. Paris. vol. 7, 232 pp.
LINNE. C. VON
1758. Systema naturae... Stockholm, 10th ed. Vol. 1, 824 pp.
MÖRCH, O.A.L.
1852. Catalogus Conchyliorum quae reliquit... Comes de Yoldi. Klein, Hafniae, pt. 1. 170 pp.
MYERS, B.W. and A. D'ATTILIO
1986. Comments on the protoconch in the Muricidae with illustrations. Festivus 18(5):55-77. 92 figs.
PAYRAUDEAU, B.C.
1826. Catalogue descriptif et methodique des annelides et des mollusques de l'ile de Corse. Paris. 218 pp., 8 pls.
PERRY, G.
1811. Conchology or the natural history of snails... Miller, London. 4 pp. 61 pls
PONDER, W.F.
1972. Notes on some Australian genera and species of the family Muricidae. Jour. Malac. Soc. Aust. 2(3):215-248.

RADWIN, G.E. and A. D'ATTILIO
1970. A new species of *Muricopsis* from west Mexico. Veliger 12(3):351-356, pl 52.
REEVE, L.A.
1845. Conchologia iconica... Vol. 3. *Murex* pls 1-36.
SOWERBY, G.B. JR.
1834. Conchological Illustrations *Murex* pls. 58-67. London.
1841. Conchological Illustrations *Murex* pls. 187-199, London.
VOKES, E.H.
1971. Catalogue of the genus *Murex* Linne (Mollusca: Gastropoda); Muricinae, Ocenebrinae. Bull. Amer. Paleo. 61(268):141 pp.

A NOTE ON CEDROS ISLAND

The following is an excerpt from a letter sent to Jules Hertz by Helen DuShane after reading his recent paper on the nominal species of west coast *Pseudomelatoma* [Festivus 18(8):100-124]. Her comments on Cedros Island are published with her permission. Ed.

I would like to make comments on Cedros Island (Cerros Is.), p. 103. There is no 'typo' error. My Spanish dictionary lists "cedros" translated as "cedar," and "cerros" as "hill," both of which apply to the island off Vizcaino Bay. So I turned to Clavigero, translated from the Italian in 1937. P. 20 - "Ulloa discovered this island in 1539, and named it 'La Isla de los Cedros,' but later the name was changed to Cerros on account of its high peaks." Clavigero's History of Mexico, 1780-1781 was used for this translation. All later writers have changed back and forth in using the two names. Gerhard and Gulick (1958) in their Lower California Guidebook, refer to the island as "Isla de Cedros," and on p. 173 state "An interesting excursion can be made on foot from the village to a spring about 1300 feet up the southeast side of Cerro Cenizo, from which water is piped to the cannery. The place is a pretty oasis with a grove of cedars (from which the island gets its name) and palm trees."

OCCURRENCE OF THE NUDIBRANCH DIAPHORODORIS LIRULATOCAUDA IN NORTHWEST MEXICO

BY

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Before its recent establishment as a species, *Diaphorodoris lirulatocauda* Millen, 1985, had been confused with *Onchidoris muricata* (Müller, 1776) in the eastern Pacific. To aid in understanding the distribution of this new species, we provide these two records of its occurrence in northern California, U.S.A., and Baja California, Mexico:

1) 4 specimens (8, 7, 6, and 6 mm total length); intertidal region, Duxbury Reef, Bolinas Point, California (37°53;N; 122°42'W); *leg*. 9 July 1986, Richard C. Willan and Terrence Gosliner.
2) 1 specimen (8 mm total length); subtidal, 8.5 mm deep, southeast face of pinnacle at outer entrance of a small cove at Arbolitos, in the Punta Banda area, south of Ensenada, Baja California, Mexico (31°42'N; 116°41'W); *leg*. 12 July 1986, Hans Bertsch and Richard C. Willan.

The latter is a 120 km southern range extension to the original range reported by Millen (1985; Juan Perez Sound, Queen Charlotte Islands, British Columbia, to Point Loma, California), and the first report of *Diaphorodoris lirulatocauda* from Mexican coastal waters. *Diaphorodoris lirulatocauda* thus joins those marine species of the Oregonian and Californian faunal provinces whose distributions extend into Mexico. The northwestern coast of Baja California is zoogeographically part of the Californian marine province (Bertsch 1985).

Literature Cited

BERTSCH, HANS
1985. An international reconnaissance expedition: marine zoogeography of Baja California Sur. Environment Southwest 508:18-23.

MILLEN, SANDRA V.
1985. The nudibranch genera *Onchidoris* and *Diaphorodoris* (Mollusca, Opisthobranchia) in the northeastern Pacific. Veliger 28(1):80-93.

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BOOK REVIEW

SHELLS OF THE PHILIPPINES
By F.J. Springsteen and F.M. Leobrera 1986
Published by Carfel Seashell Museum
377 pages, 100 color plates, numerous drawings and black and white photographs; approximately 1700 marine, land and freshwater mollusks

This book has been long awaited by shell collectors world wide. The Philippine Archipelago probably has more mollusks than any other geographic area and an undertaking such as this was an immense task, especially considering the numerous new species that have been discovered during the time the book was being written. Mr. Springsteen has done meticulous research and, as far as a quick review by the writer, the results are very accurate.

SEASHELLS OF THE PHILIPPINES begins with a geography and map of the Philippines that shows the extensive area covered by the archipelago, and then a brief geological and biological history of the islands. This explains very basically why species variations occur and some species are so localized.

The shells are described briefly and well and arranged taxonomically. At the end of the marine molluscan section are a few plates and descriptions of land and freshwater shells. The color plates accompany the shell description so that it is easy to go from the description to the photograph; the description is seldom more than a page or two away. Identification of each shell on a plate is listed for quick reference on the bottom of the facing page.

The photography is excellent, showing the majority of the shells near actual size. The larger shells are reduced to a reasonable size and some of the small shells are enlarged. There is no mention of the magnification used, but a size is given in the text, which appears to be the actual size of the specimen illustrated. Color reproduction of the shells is very good. The quality of the specimens used is excellent, but that is to be expected considering that the Leobreras have access to the best sources for the shells. Another nice feature of the book is the illustration of multiple views as well as different varietal forms of some shells.

There are minor errors in the book, as there are in any new book, but overall the book is outstanding and a must in every shell collector's library.

Donald Pisor

CLUB NEWS

THE BAJA PARTY

It was great fun! The Baja Party was held in the home and garden of Barbara and Wes Farmer on Saturday evening September 27th. All the best Baja buddies were there in their Baja best. Luminarias greeted the guests and bordered the garden. Bales of straw provided great seating and Mexican music added atmosphere.

After a feast of delicious Mexican food, it was time to attack the elephant piñata suspended from a tree. Normally gentle adults turned ferocious causing Nola Michel, who was in charge of the rope, to take cover behind the tree. More than once the elephant also took cover--on a limb of the tree. Finally after a great thwack by Richard Herrmann, the fifth contestant, the individually wrapped shells hidden inside the pinata were loosed and gathered by the guests.

It was a lovely evening and our thanks to our gracious hosts, Barbara and Wes.

THE ANNUAL CHRISTMAS PARTY

Mark your calendars! Saturday evening December 6th has been reserved for the Club's annual Christmas dinner party. By popular demand, it will again be held at the Mariners' Club. Complete details and map will be included in the November issue of The Festivus.

THE FESTIVUS

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MEMBERSHIP AND SUBSCRIPTION

Annual dues are payable to San Diego Shell Club. Single member: $10.00; Family membership: $12.00 Overseas (surface mail): $12.00 Address all correspondence to the San Diego Shell Club, Inc., c/o 3883 Mt. Blackburn Ave., San Diego, CA 92111 Single copies of this issue: $5.00. Postage is additional.

Meeting date: third Thursday, 7:30 P.M. Room 104, Casa Del Prado, Balboa Park

The Festivus is published monthly except December. The publication date appears on the masthead above.

PROGRAM

The Stephen Birch Aquarium-Museum
Plans and Progress

Mr. Don Wilkie, Director of the Scripps Institution of Oceanography Aquarium Museum for the past 20 years, will discuss the exciting plans for the long awaited new aquarium museum.

Meeting date: November 20, 1986

CONTENTS

CLUB NEWS

FROM THE MINUTES - SAN DIEGO SHELL CLUB MEETING - OCTOBER 16, 1986

Two members of the Underwater Photographic Society, Jerry Allen and Mike Miller, presented a slide program, synchronized to music, of nudibranchs found in the Philippines. The program included images above and below water, but emphasized the nudibranchs. Because of the variety of species shown and the quality of the photography, the show was run two times at the request of the members. A discussion followed the show.

The slate of officers for 1987 chosen by the board in its role as nominating committee was presented and is as follows:

President: Wes Farmer
Vice President: Larry Buck
Treasurer: Margaret Mulliner
Recording Secretary: Barbara Farmer
Corresponding Secretary: Ginny Herrmann

Each nominee has consented to serve. Nominations from the floor will be accepted at the November meeting followed by the election of officers.

The Christmas party, to be held December 6, was discussed. The details including cost, menu and map will be published in the November Festivus.

Ian Hamilton attended the Botanical Garden Foundation meeting and learned that current meeting rooms will remain in effect for 1987 and no groups will be moved.

Librarian Margaret Mulliner reminded everyone to utilize the library but to remember to sign out library books; and also to cross out their names when returning the books the next month so that accurate records can be maintained.

Wes Farmer announced that the November speaker will be Don Wilkie who will discuss plans for the new Aquarium.

Ginny Herrmann

THE ANNUAL CLUB CHRISTMAS DINNER PARTY

The Club Christmas Party on December 6, 1986 will again be held in the Destroyer Room at the Mariner Officers' Club, 32nd Naval Station thanks to the efforts of our host, John Souder.

The festivities begin at 6:00 P.M. with no host cocktails. Dinner will be served promptly at 7:00 P.M. and the menu is as follows:

Fresh green salad, broiled breast of chicken a la Mariner with champagne sauce, tomato provencale, and baked restuffed potato, rolls and butter. Dessert will be chocolate mousse cake and tea and coffee are included. The Club will provide complimentary dinner wine.

Following dinner and the traditional Club shell gift exchange, those attending are invited to the main room for dancing to the mellow music of the dance band. The cost for the entire evening including gratuities and tax is $11.50. Deadline for reservations is Monday, December 1. Checks should be made payable to the San Diego Shell Club and given to Treasurer Nola Michel at the November meeting or sent to the Club address (front page).

Remember to participate in the traditional gift exchange. Bring your gift wrapped shell to place under the tree. Place collecting data and name inside the package. On the outside place only general locale i.e. Caribbean, eastern Pacific etc. Numbers will be drawn and those bringing a shell gift will choose one from under the tree.

It will be a great party, as usual. Come and enjoy the season with your friends. Guests are welcome. For directions to the Mariner Club, see map on the last page of this issue.

COMMENTS ON A COLLECTION OF CORALLIOPHILIDAE FROM THE CONTINENTAL SHELF OF NORTH WEST AUSTRALIA

BY

ANTHONY D'ATTILIO

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The following is a report of molluscan species in the family Coralliophilidae received for identification from Dr. Fred Wells of the Department of Malacology, Western Australian Museum (WAM) in August 1985. Most of the species were collected in deep water to 500 meters from the northwest shelf of Western Australia as part of a three year program of exploratory trawling (begun in 1982) for potential fishery resources.

Several of these western Australian species are illustrated herein with the kind permission of the Western Australian Museum. Because the systematic relationship of the many species referred to in most literature as *Latiaxis* or *Coralliophila* is poorly understood, the supraspecific taxonomy of this family is badly in need of systematic revision. In this paper *Coralliophila* and *Latiaxis* are used in the broadest sense.

Of particular interest because of its deeper water habitat is *Coralliophila teramachii* (Kuroda, 1953) (Figures 1 and 2) which is said to be found very rarely off Japan in about 200 fathoms (approximately 366 meters). The specimen illustrated here was taken in 450-452 meters.

Figure 1 *Coralliophila teramachii* (Kuroda, 1953). Length: 40.5 mm
Loc.: SW of Imperieuse Reef, Rowley Shoals, West Australia [18°10'S; 118°13'E]
Date: August 17, 1983

Figure 2. Dorsal view of specimen shown in Figure 1. WAM #3232-83
Leg. P. Berry and N. Sinclair on F.V. Courageous, in mud, Beam trawl

Coralliophila fearnleyi (Emerson & D'Attilio, 1965) (Figures 3 and 4) was described from specimens obtained by pearl-shell divers operating near Cooktown, Queensland, Australia. The species occurs over most of the western Pacific but the largest specimens (holotype 56.3 mm L) remain those collected near Cooktown.

Figure 3 *Coralliophila fearnleyi* (Emerson & D'Attilio, 1965)
Loc. Champagny Island, Bonaparte Archipelago, Western Australia

Figure 4. Dorsal view of specimen shown in Figure 3. WAM #864-85. Length: 43.3 mm
Leg. Barry Sharpe
Date: December 19-20, 1982 at low tide

Coralliophila costularis (Lamarck, 1816) has an Indo-Pacific and Red Sea distribution. The largest specimens examined from southeastern Australia are in the collection of the Australian Museum at Sydney. Those match in size the specimen from northwestern Australia (Figures 5 and 6).

The series of six specimens of *Latiaxis mawae* (Gray in Griffith & Pidgeon, 1834) shows the ontogeny of the shell; the most obvious morphological change being the gradual detachment of the body whorl from the shell (Figure 7). The species has a wide distribution and was reported from eastern Australia off Cape Moreton by Donald F. McMichael (1961) in "New Species and New Records of Marine Mollusca from Australia," Journal of the Malacological Society of Australia, pages 50-57.

The very few records of *Latiaxis latipinnatus* Azuma, 1961, show that this species has been collected essentially from southeastern Japan (Figures 8 to 10). Study of the type of *L. latipinnatus*, a not clearly understood species, may show that the species illustrated from Northwestern Australia may not be conspecific.

The identification of *Latiaxis cf. vicdani* Kosuge, 1980 (Figures 11 and 12) is tentative since the condition of the specimen is poor. It is found very rarely in Philippine waters. To my knowledge this would be the first record of this species beyond Philippine waters.

Figure 5 *Coralliophila costularis* (Lamarck, 1816) WAM #865-85
Loc.: Beacon Is., Goss Passage, Houtman Abrolhos Is. W.A.

Figure 6. Dorsal view of specimen shown in Figure 5. Length: 51.0 mm
Leg. S. Slack-Smith, C. Bryce
Date: March 23-25, 1983

Top row:
l to r
44.0 mm L
41.2
39.6

Bottom row
l to r
32.1 mm L
19.1
12.9

Figure 7 *Latiaxis mawae* (Gray in Griffith & Pidgeon, 1834)
Top row & bottom left: WAM #860-85. Leg. L. Marsh on "Soela'
Loc.: 110 mi. NNW of Port Hedland, W.A., in 200-201 m, Engel trawl in limestone rocks and mud. Date: April 2, 1982
Bottom center & right: WAM #867-85. Leg. B.R. Wilson on W.A. Hawaiian Exp.
Loc.: Approx. 7 mi. NNW of Anchor Is., Onslow, W.A.; 84.1 m in fine sand and gravel. Date: June 17, 1960

Figure 8 *Latiaxis latipinnatus* Azuma, 1961
WAM #1774-84. Length: 38.2 mm
Loc.: NW of Augustus Is., W.A.
[13°27.6'S;122°44.4'E to 13°25.0'S; 112°47.0'E]
Leg.: S.M. Slack-Smith on F.V. 'Soela'
Dat: November 14, 1984
Engel trawl on sand and rock rubble

Figure 9 Dorsal view of specimen shown in Figure 8.

Figure 10 View from spire of specimen shown in Figures 8 and 9

Figure 11 *Latiaxis cf viedani* Kosuge, 1980
WAM #3234-83. Length: 45.1 mm
Loc.: NE of Mermaid Reef, Rowley Shoals, W.A. [16°56'S;120°06'E]
Prawn trawl, 431 m

Figure 12 Dorsal view of specimen shown in Figure 11
Leg. P. Berry, N. Sinclair on F.V. Courageous Date: August 20, 1983

With the exception of one unidentified coralliophilid species, the remaining (unfigured here) are in all respects conspecific with those same species occurring in the western Pacific. They are listed below with their WAM numbers. I have no comparative evidence at hand, however, relating to the depth and precise locality at which these same species are found in the western Pacific.

Latiaxis fusiformis (Martens, 1902) WAM 1576-84
Latiaxis cf. *armatus* Sowerby, 1912 WAM 3310-83
Latiaxis winckworthi Fulton, 1930 WAM 866-85
Latiaxis spinosus Hirase, 1908 WAM 863-85
Coralliophila sp. WAM 862-85

ACKNOWLEDGMENTS

My appreciation goes to Dr. Fred Wells of the Western Australian Museum for giving me the opportunity to examine these deepwater specimens and to Mr. David K. Mulliner for the fine photography of these specimens.

FINDING HELIX APERTA BORN IN SAN DIEGO COUNTY, CALIFORNIA

BY

RICHARD CERUTTI

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Editor's Note: While monitoring a grading project called Gateway Center East on the southeast side of Interstate 15 and Freeway 94 in southeast San Diego, Mr. Cerutti's keen interest in natural history led him to collect for identification, a group of *Otala lactea*(Müller, 1774) [see C.M. Hertz (1985)] and to observe egg-laying in that species (Cerutti, 1985). While observing *Otala lactea*, Richard Cerutti found a snail among them which looked different and he brought this specimen which he called "Blackfoot" for its dark greenish-black foot, to the Malacology Department. It was identified by Mr. Anthony D'Attilio as *Helix aperta* Born, 1778, a European and North African snail. The following is from Mr. Cerutti's field notes.

When I returned to work on the Gateway Center East grading project Thursday (December 18, 1985) after getting "Blackfoot" identified as *Helix aperta*, (Figure 1) I was curious to see if I could find more *H. aperta* on the project (see map).

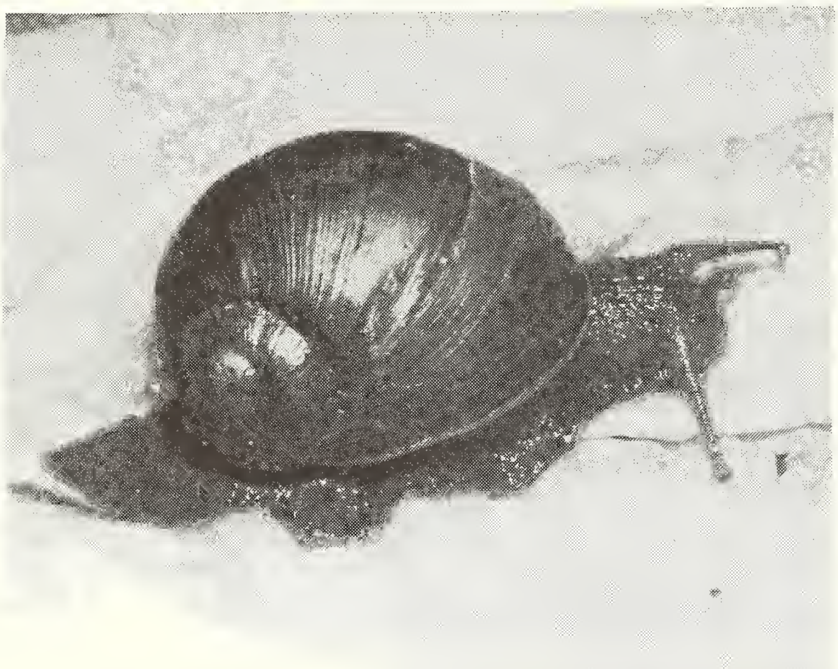


Fig. 1. *Helix aperta* Born, 1778
Length: 30.1 mm SDNHM 92010
Leg. Richard Cerutti Date: Dec. 10, 1985
Loc.: southeast side of Interstate 15 and Freeway 94 at Gateway Center East Grading Project.
Photography: David K. Mulliner

I went back to the same spot where I had found the first *H. aperta* and with Mark Roeder, a coworker, spent about 15 minutes looking around and found none of the snails. Later that afternoon I returned to the area and after looking for about ten minutes, I was rewarded for my persistence by not only finding a specimen of *H. aperta* but finding one laying eggs. I collected it with its nest to study and compare it with the egg nests of *H. aspersa* and *Otala lactea* both of Müller, 1774 The *Helix aperta* appeared to be laying its eggs in the same way as *Helix aspersa* and *Otala lactea* [see Cerutti (1986)].

Still later on that day I found two additional *H. aperta* about 25 yards east of the first location. About 200 yards farther north I found another *H. aperta* within a few inches of three *Otala lactea* all under a dead palm frond on the ground. I collected a total of three *Helix aperta* that day and it seems to me that this snail is well established at this locale. Other coastal San Diego County sites at which I collected *Helix aperta* are listed here and are noted on the map.

Interstate 15 (Wabash) and Freeway 94, east side (Gateway Center) San Diego, 12/10/85

Chollas Creek between Fairmount Ave. (north) and Federal Blvd (south), 12/15/85

Imperial Ave. and 44th St. (southwest side), San Diego, 1985

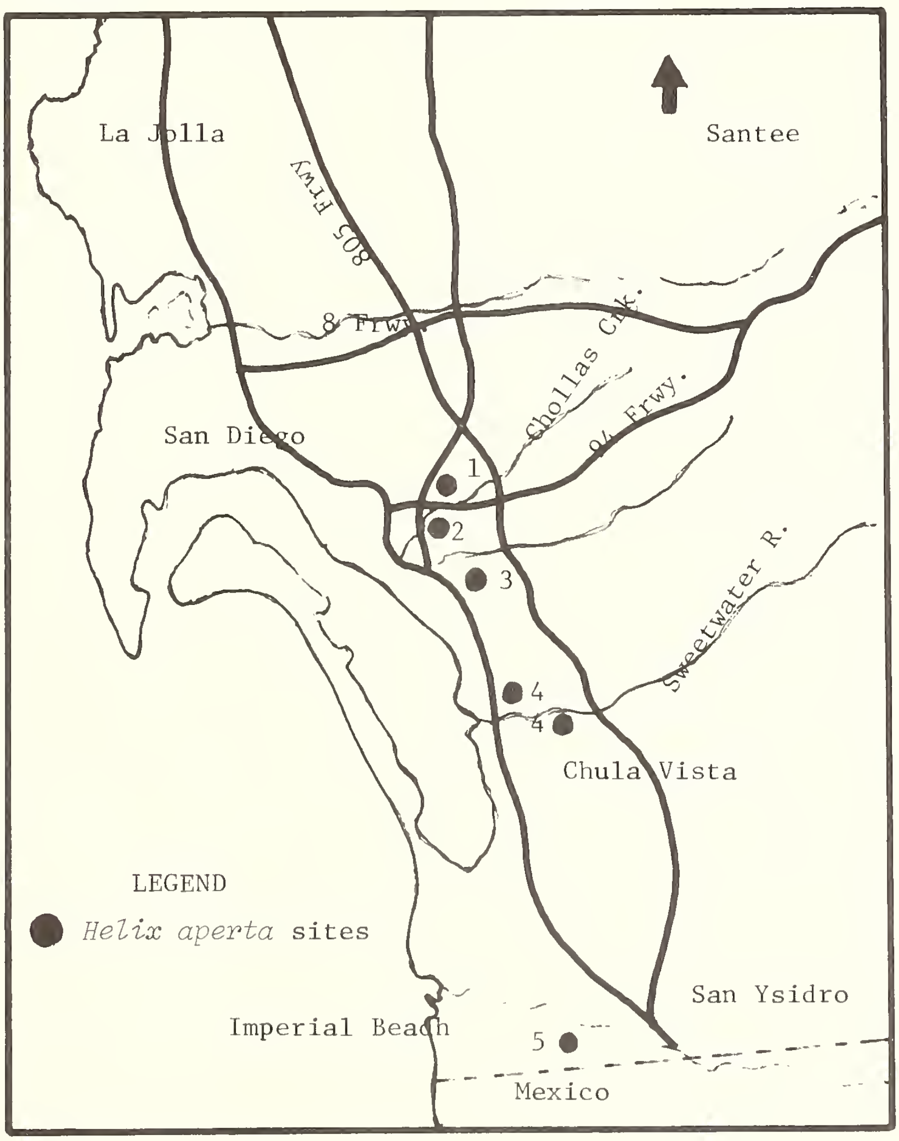
Sweetwater River Valley, Edgemere Ave. (east) and D St. (west), Chula Vista-National City, 1986

Tia Juana River Valley, Dairy Mart Rd., Monument Rd. (north and south sides), San Ysidro, 1/1/86

Literature Cited

CERUTTI, RICHARD
1986. *Otala lactea* (Müller, 1774) laying eggs. Festivus 17(6):80-81

HERTZ, CAROLE M.
1985. *Otala lactea* (Müller, 1774) in San Diego County, California. Festivus 17(11):119-120



Map showing coastal San Diego sites at which *Helix aperta* was collected by Richard Cerutti

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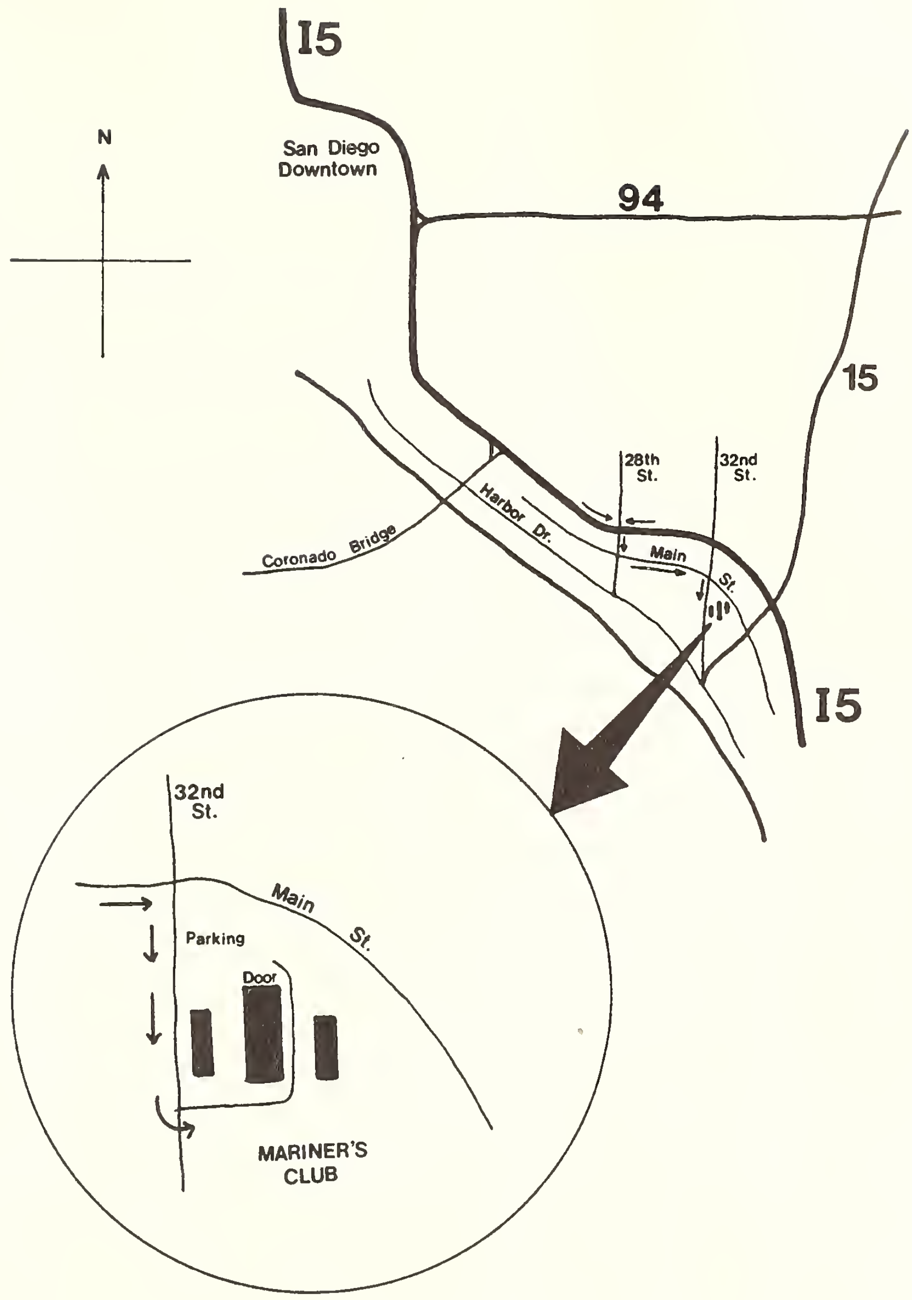
I5
N
San Diego
Downtown
94
15
28th
St.
32nd
St.
Harbor Dr.
Main
St.
Coronado Bridge
I5
32nd
St.
Main
St.
Parking
Door
MARINER'S
CLUB

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AUTHOR INDEX*

1970 through 1986

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This index is a compilation of articles, arranged by author, which have appeared in THE FESTIVUS since its first issue in 1970. All informative articles are included. Following the author's name, each entry includes (in chronological order) the year, title, volume, (number): pages, and illustrations.

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1978. At Tourmaline surfing beach, September 1978. X(9):64
1978. Range Extension for *Tegula pulligo,* rediscovered. X(7):51-54, 2 figs.
1978. Collecting in Playa de Santiago. X(9):66
1979. [Ed.] Radwin and D'Attilio paper on Muricacean gastropods provides names for six species pictured in a previous FESTIVUS series. XI(3):25
1979. Observations on the differences between the juvenile and mature *Turritella anactor* Berry, 1957. XI(6):48-49, 3 figs.
1980. Editor's note [A collation for Keen (1971)] XII(4):63
1980. Notes on *Turritella leucostoma* Valenciennes, 1832. XII(9):103-109, 15 figs.
1981. In memoriam: Joshua L. Baily, 1889-1981 [List of publications authored by Dr. Baily]. XIII(5):63-65
1982. Book review: The Audubon field guide to North American seashells. XIV(1):10-11
1982. *Rumina decollata* (Linnaeus, 1758): a belated welcome to San Diego. XIV(5):60-61, 3 figs.
1983. Book review: Seashells of Southern Africa by Kilburn and Rippey. XV(3):31-32
1983. Book review: The IUCN Invertebrate Red Data Book by Wells, Pyle and Collins. XV(9):96-98
1983. Illustration of the types named by S. S. Berry in his "Leaflets in Malacology." XV, Supplement, pp. 1-42, 92 figs.
1984. Field observations on *Bulla gouldiana* Pilsbry, 1893. XVI(3):34
1984. Finding *Simnia barbarensis* (Dall, 1892) in San Diego. XVI(4):41-43, 6 figs.
1984. A preliminary report on *Pseudomelatoma sticta* Berry, 1956 (Turridae: Pseudomelatominae). XVI(7):76-80, 7 figs.
1984. Strange aquarium behavior of *Bursa californica* (Hinds, 1843). XVI(11):122
1985. Book review: Spirals from the Sea by Safer and Gill. XVII(4):39
1985. Book reviews: Kawamura Collection World Seashells of Rarity and Beauty; and Red Sea Shells by D. Sharabati. XVII(8):82
1985. *Otala lactea* (Müller, 1774) in San Diego County, California. XVII(11):119-120, 1 fig.
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1986. Book review: It's easy to say *Crepidula!* (Kreh PID' yuh luh) by Cate and Raskin XVIII(6):85
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1986. Herbert Nelson Lowe 1880-1936, a gifted amateur conchologist from southern California XVIII(3):26-43, 17 figs.

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1985. *Murexiella diomedaea* (Dall, 1908) from the Gulf of California. XVII(9):90-93, 6 figs.

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1982. A review of *Chama buddiana* C. B. Adams, 1852 (Bivalvia: Chamidae). XIV(2):15-24, 23 figs.

HERTZ, CAROLE M. and JULES HERTZ
1972. Cayucos revisited...for the second time. III(1):4
1973. Playing in Kauai. IV(3):19-20
1975. Eggs of *Hormospira maculosa.* VI(6):36, 1 fig.
1982. Distribution of *Eulimostraca attilioi* Hertz and Hertz, 1982. XIV(11):134-135, 3 figs.

HERTZ, CAROLE M. and D. K. MULLINER
1974. An unusual find in San Felipe *(Ophichphis triserialis).* V(6):118. 1 fig.

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1982. The distribution of *Diplodonta orbellus* (Gould, 1851) and a diagnosis of *Diplodonta subquadrata* (Carpenter, 1856) (Bivalvia: Ungulinidae). XIV(7):76-87, 14 figs.
1984. A comparison of two related species of *Tellina: Tellina hiberna* Hanley, 1844 and *Tellina amianta* Dall, 1900. XVI(3):28-34, 15 figs.
1985. *Pandora (Clidiophora) cornuta* C. B. Adams, 1852, and new information on its distribution. XVII(10):101-110, 11 figs.

HERTZ, JULES. *See* A. D'Attilio *See* C. M. Hertz *See* J. Keeler
1970. Book review: Marine Shells of Southern California by J. H. McLean. I(2):16-17
1970. Book review: A Collector's Guide to West Coast Chitons by G. and L. Burghardt. I(3):6
1970. Book review: Marine Shells of the Pacific by W. D. Cernohorsky. I(6):2
1970. Book review: The Living Cowries by C. M. Burgess. I(7):5
1970. Book review: Living Volutes, a monograph of the Recent Volutidae of the world by Weaver and duPont. I(11):2-3
1971. Book review: Olive Shells of the World by Zeigler and Porreca. II(1):9-10
1971. Book review: West American Mollusks of the Genus *Conus,* by G. D. Hanna. II(2):7
1971. Observations *(Conus regularis).* II(2):7-8
1971. Book review: Marine Shells of Southern Africa by D. H. Kennelly. II(3):7
1971. Book review: Hybridization in the Eastern Pacific Abalones (Haliotis) by Owen, McLean and Meyer. II(4):7
1971. Book review: Leaflets in Malacology by S. S. Berry. II(6):3
1971. Book review: Seashells of Tropical West America, 2nd ed., by Keen. II(11):5

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1979. Minute shells *(Elaeocyma hemphillii).* XI(3):26-28, 1 fig.
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1979. Minute shells (Update on *Turbonilla tridentata* Carpenter, 1865). XI(5):41-42, 1 fig.
1979. Minute shells *(Bittium munitum* and/or *Bittium munitum munitoide).* XI(6):47, 1 fig.
1979. Minute shells *(Bittium quadrifilatum* Carpenter, 1864). XI(7):54, 1 fig.
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1979. Collecting in Santa Cruz, California [*Turcica caffea, Astraea gibberosa, Ocenebra inornata*] XI(8):67-68, 3 figs.
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1980. Minute shells *(Amphissa undata* (Carpenter, 1864)). XII(5):66, 1 fig.
1980. Minute shells *(Daphnella clathrata* Gabb, 1865). XII(8):97-100, 5 figs.
1980. Notes on *Calliostoma variegatum* Carpenter, 1864. XII(9):115-116, 1 fig.
1980. *Modiolus capax* (Conrad, 1837). XII(11):135
1981. A review of several eastern Pacific *Bittium* species (Gastropoda: Cerithiidae). XIII(3):25-44, 27 figs.
1981. Notes on *Crockerella crystallina* (Gabb, 1865) (Gastropoda: Turridae). XIII(10):108-112, 10 figs.
1982. Minute shells *(Caecum californicum* Dall, 1885) (Gastropoda: Rissoacea). XIV(1):12-13, 2 figs.
1982. *Lyria (Enaeta) cumingii* (Broderip, 1832): an unusual find in San Felipe, Baja California, Mexico. XIV(7):74-75, 1 fig.
1982. Minute shells *(Odostomia helga* Dall and Bartsch, 1909 and *Odostomia fetella* Dall and Bartsch, 1909). XIV(10):118-123, 13 figs.
1983. *Fissurella rugosa* Sowerby, 1835 and *Fissurella microtrema* Sowerby, 1835. XV(7):72-79, 5 figs.
1985. Book review: Systematics of *Fissurella* in the Peruvian and Magellanic Faunal Provinces (Gastropoda: Prosobranchia) by J. H. McLean. XVII(1):10
1986. Review of the nominal species of *Pseudomelatoma* from the west coast of California and Baja California, Mexico (Turridae: Pseudomelatominae). XVIII(8):100-124, 48 figs.

HERTZ, JULES and ANTHONY D'ATTILIO
1979. *Favartia garrettii* (Pease, 1868): notes and corrections to the literature. XI(2):16-18, 2 figs.

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1983. Collecting in Mazatlan. XV(2):19-26, 9 figs.
1983. Follow-up on "Collecting in Mazatlan." XV(4):45-46, 2 figs.
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1970. Aquarium observations *(Cassis centiquadrata)*. I(6):3
1972. Breeding habits and life cycles of three species of nudibranchs from the eastern Pacific. III(9):1-5, 10 figs.
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1980. Exploring the underwater ancient sea cliffs, an ecosystem. XII(8):93-94, 5 figs.
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1981. Book review: An update [to corrected edition of A Guide to the Nudibranchs of California...]. XIII(10):115
1982. Update on Nudibranchia from tropical West America. XIV(11):132-133
1984. *Oliva porphyria*, a great find. XVI(6):71-72, 3 figs.
MULLINER, DAVID, M. MULLINER, H. BRADNER, M. BRADNER, M. ANDERSON, J. ANDERSON
1984. Vava'u '83, a trip to the South Pacific kingdom of Tonga. XVI(2):11-19, 9 figs.
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1984. Intertidal mollusks collected at Bahia San Luis Gonzaga, Baja California Norte, Mexico. XVI(4):46-47
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1984. Checklist of molluscan species collected in Tonga. XVI(2):17-19
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1970. Discovery *(Loliga opalescens)*. I(9):6-7
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1973. Living on the high tide. IV(7):48-49
1975. Exotic brown forest (fauna of the kelp beds). VI(11):68-70, 5 figs.
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1976. Book review: What shell is that? by Neville Coleman. VII(6):35
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1978. Book review: Field Guide to Seashells of the World by G. Lindner. X(8):58
1978. Book review: Marine Shells of the West Coast of North America by I. S. Oldroyd; 4 vols. X(7):56-57
1978. Minute invader (bivalve boring into *Ocenebra foveolata*). X(4):34-35, 2 figs.
1979. *Bathybembix bairdi* (Dall, 1889) and the types of some related genera. XI(1):5-7, 2 figs.
1979. Book review: Cone Shells, a synopsis of the living Conidae by J. G. Walls. XI(5):38
1979. An historical review of the systematics of *Orbitestella diegensis* (Bartsch, 1907). XI(8):64-66 1 fig.
1980. Book review: Sea Shells of Western Europe by Bouchet, Danrigal and Huyghens. XII(2):21
1981. *Bellaspira grippi* (Dall, 1908) (Gastropoda: Turridae). XIII(1):8-9, 2 figs.
1981. Book review: Intertidal Invertebrates of California by Morris, Abbott and Haderlie. XIII(1):6-7
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1983. Book review: Seashells of Oman by D. and E. Bosch; and Seashells of the Arabian Gulf by K. Smythe. XV(5):54-55
1984. Book review: Collectible shells of Southeastern U.S., Bahamas and Caribbean. XVI(8):89
1984. Book review: Distribution of shallow water marine mollusca, Yucatan Peninsula, Mexico by H. and E. Vokes. XVI(4):44
1986. Book review: Between Pacific Tides, revised by Phillips. XVIII(4):50
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1979. The misidentified *Buccinum chartium*. XI(7):56-57, 2 figs.
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1979. Range extension for *Isognomon janus* Carpenter, 1857 (Bivalvia). XI(10):79-81, 2 figs.
1980. Observations on *Nipponotrophon scitulus* (Dall, 1891). XII(7):84-89, 11 figs.
1980. Observations on *Dimya californiana* Berry, 1936 and redescription of the hinge (Bivalvia: Dimyacea). XII(10):119-124, 3 figs.
1986. Comments on the protoconch in the Muricidae with illustrations. XVIII(5):55-77
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1983. Is there a *Tellina reclusa* or is *Tellina brevirostris* a variable species? XV(8):81-87, 12 figs.
1984. Examination of *Gari helenae* Olsson, 1961 and redescription of the hinge ligament. XVI(2):20-25, 14 figs.

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1983. A note on *Macoma (Psammacoma) elytrum* Keen, 1958. XV(6):64-67, 6 figs.
1983. A correction to "A Note on *Macoma (Psammacoma) elytrum* Keen, 1958." XV(8):88
MYERS, BARBARA W. and MARGARET MULLINER
1981. Comments on *Acmaea funiculata* (Carpenter, 1864). XIII(9):99-101, 5 figs.
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1979. Food preferences of *Scorpaenichthys marmoratus*. XI(8):66
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1978. Diving experiences in Puerto Rico. X(8):62-63
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1971. A new system of classification and identification for the class Amphineura (Abstract). II(5):6
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1984. Summary of laws and regulations relating to shell collecting in Southern California and Mexico (as of Feb. 1984). XVI(3):36-37
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1986. Book review: Shells of the Philippines by Springsteen and Leobrera. XVIII(10):146
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1982. Three *Capulus* species in the eastern Pacific: some comments. XIV(5):52-57, 10 figs.
1986. *Crosslandia daedali* Poorman and Mulliner, 1981. XVIII(2):21-22, 2 figs.
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1981. Comments on a lovely *Murexiella* (Gastropoda: Muricidae) from the Gulf of California [*M. diomedaea*]. XIII(5):61-62, 1 fig.
RADWIN, GEORGE E.
1970. The Columbellidae (notes from talk given to the Club). I(2):1-3
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1974. *Acanthina lugubris* reappears in San Diego. V(5):114
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1974. A review of the genus *Muricopsis* (Muricidae: Muricacea) (excerpt from a talk given to the Club). V(9):138-140, 5 figs.
REESE, K. M.
1973. How sea animals fight falling salinity (reprinted courtesy Chem. Engr. News). IV(11):75
1974. Mangrove in trouble in southwest Florida (reprinted courtesy Chem. Engr. News). V(3):104
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1972. Isolation and divergence. III(2):3-5
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1972. Marine Biology in Antarctica. III(11):1-5, 9 figs.
1975. Comments on a "Draft Report on Recent Abalone Research in California with Recommendations for Management." VI(4):19-24
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1981. Book review: A Guide to the Nudibranchs of California. XIII(8):94-95
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1981. Another senior synonym in *Nipponotrophon* (Gastropoda: Muricidae). XIII(5):58-60, 2 figs.